SUPPLEMENT.

The Mining Journal,

RAILWAY AND COMMERCIAL GAZETTE:

FORMING A COMPLETE RECORD OF THE PROCEEDINGS OF ALL PUBLIC COMPANIES.

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No. 2586.—VOL. LV. LONDON, SATURDAY, MARCH 14, 1885. PRICE (WITH THE JOURNAL) SIXPENCE BY POST £1 4s. PER ANNUM.

FIRST SILVER MEDAL, ROYAL CORNWALL POLYTECHNIC —Highest Award for Effectiveness in Boring, and Economy in the Consumption of Air.

JUBILEE EXHIBITION, 1882.

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FIRST AWARD BORING CONTEST DOLCOATH MINE, DECEMBER, 1881.

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MPING and other LAND ENGINES and MARINE STEAM ENGINES of the largest and most approved kinds in use, SUGAR MACHINERY, ILLWORK, MINING MACHINERY, and MACHINERY IN GENERAL.
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IN GOOD CONDITION, AT MODERATE PRICES—viz,
MPING ENGINES; WINDING ENGINES; STAMPING ENGINES, TEAM CAPSTANS; ORE CRUSHERS; BOILERS and PITWORK of arious sizes and descriptions: and all kinds of MATERIALS required for INING PURPOSES

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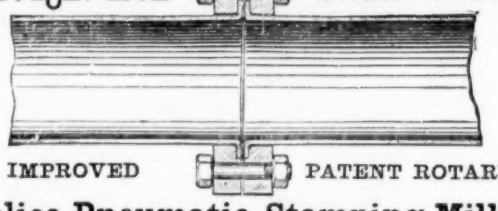

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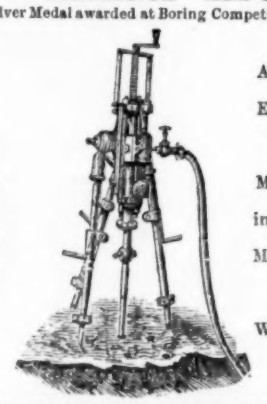

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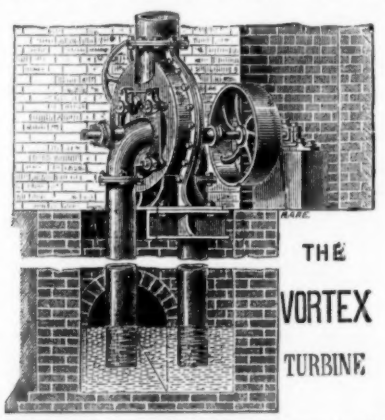

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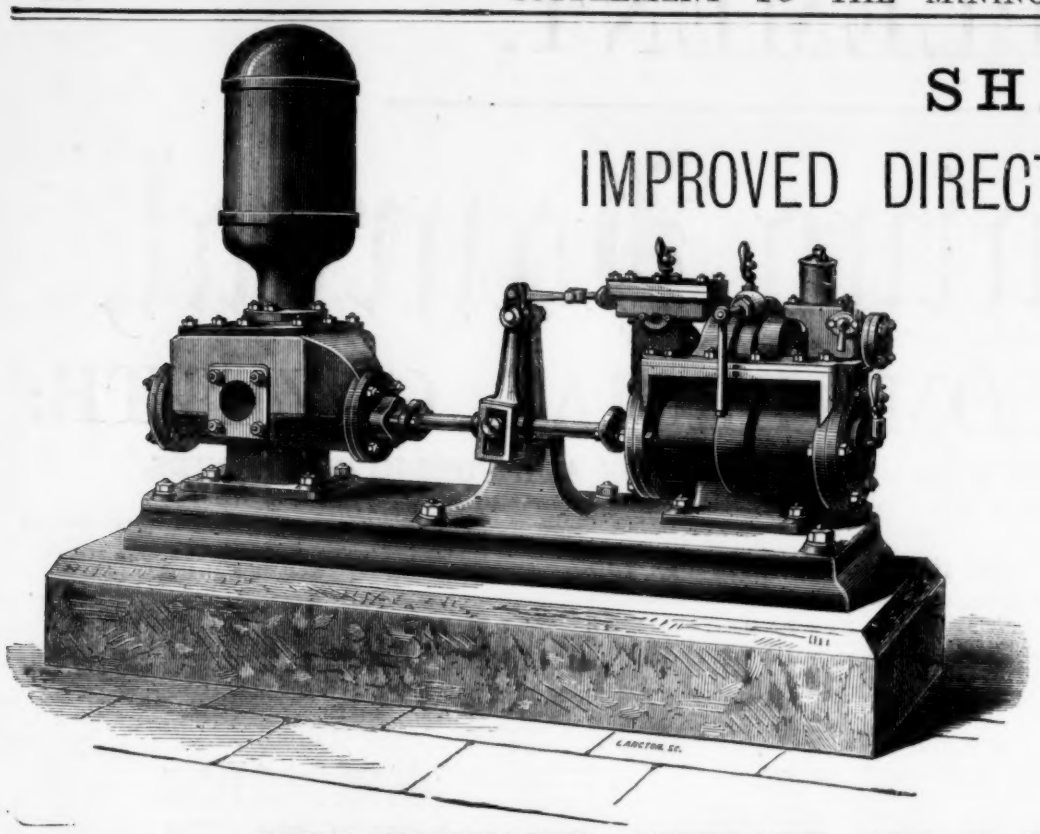

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These Pumps possess advantages over all Direct-Acting Pumps. The utmost regularity in reversing, and steadiness in working is so thoroughly secured that a piston speed of 8 ft. per minute has been obtained.

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BELL'S PATENT ASBESTOS BLOCK PACKING for High Pressure Engines

The following testimonials refer to this Packing:—

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DEAR SIR,—I have much pleasure in answering your note. Bad times in mining have compelled me to try all kinds of expedients in order to effect saving; some have succeeded and some have failed, but my underground manager, Capt. Hughes, has just said to me by the telephone—"The Asbestos Packing is the best thing ever brought here."

It saves money and trouble, but like my gas purifying oxide it lasts so long that you must not expect another order from me for twelve months at least.

Yours truly, T. P. EVANS,
Late H.M. Inspector of Metalliferous Mines.

Mr. J. Bell.

Manchester, Sheffield, and Lincolnshire Railway—Steamship Department,
Grimsby, April 10th, 1884.

DEAR SIR,—I have much pleasure in stating that after a trial of over nine months, and comparing it with other packings, I can confidently recommend your Asbestos Packing. It is especially valuable when high-pressures are employed, as in cases where other packings have perished, owing to high temperatures, your packing has invariably stood well. I have also used it with complete success when a gland has heated with other packings, and also in cases of badly scored piston rods. I consider the results I have obtained by its use for our marine engines to have been in every way highly satisfactory.

Yours truly, G. H. CLARKE, Sup. Engineer.

Mr. J. Bell.

Department of the Director of Navy Contracts,
Admiralty, Whitehall, 20th June, 1884.

SIR,—I have to inform you that your tender has been accepted for Bell's Rolled Cloth Asbestos Packing to sample submitted:—Elastic core ... ... Square.
" " ... ... Round.

To Mr. John Bell. JOHN COLLETT, Director of Navy Contracts.

TRADE MARK.

BELL'S ASBESTOS.

The goods of this house are of the highest quality only, and no attempt is made to compete with other manufacturers by the supply of inferior materials at low prices. All "home" orders should be sent direct to the undermentioned depôts and not through Agents or Factors.

BELL'S ASBESTOS BOILER AND PIPE COVERING COMPOSITION, for coating every class of steam pipes and boilers, non-combustible and easily applied when steam is up; adheres to metals and preserves them from rust; prevents the unequal expansion and contraction of boilers exposed to weather; covers 50 per cent. more surface than any other coating, and is absolutely indestructible. It can be stripped off after many years' use, mixed up with 20 per cent. of fresh, and applied again. The composition is supplied dry, and is only to be mixed with water to the consistency required for use.

A Horizontal Boiler, 17 ft. 6 in. long, 15-H.P., gave the following results:—

Temperature on Plates - - - 186 deg.
" " Covering - - 94 deg.

One ton of coal was saved per week, and although the fire was raked out every evening, 20 lbs. of steam were found in the boiler next morning.

The following Testimonials refers to this Covering:—

Offices of the Wimbledon Local Board, Wimbledon, Nov. 28th, 1883.

DEAR SIR,—It may interest you to know that we save exactly 40 per cent. in fuel through using your covering. Yours truly, W. SANTO CRIMP, C.E., F.G.S.

The Tamar and Kit Hill Granite Company (Limited),

Mr. John Bell, Southwark, S.E. Gunnislake, Tavistock, 8th April, 1884.

SIR,—I have much pleasure in stating that the Asbestos covering applied by you to the boiler of our travelling crane at Kit Hill has yielded most remarkable results. Since it has been in use we have saved fully half our coals, and have effected a great saving in the time it takes to get up steam, which is often a matter of great importance to us. I should add that the crane runs on high gantries, and is fully exposed to all weather. I have formed the highest opinion of your Asbestos as used for this purpose, and as you are aware, have had another boiler similarly covered, though it has not since been used. I can most strongly recommend the material.

I am, Sir, yours faithfully, W. J. CHALK, Assoc. M. Inst. C.E., Engineer and Manager.

BELL'S ASBESTOS and INDIA-RUBBER WOVEN TAPE and SHEETING, for making every class of Steam and Water Joints. It can be bent by hand to the form required without puckering, and is especially useful in making joints of manhole and mudhole doors. It is kept in stock in rolls of 100 ft., from ¼ in. to 3 in. wide, and any thickness from 1/16 in. upwards. Manhole covers can be lifted many times before the renewal of the jointing material is necessary. The same material is made up into sheets about 40 in. square, and each sheet bears the Trade Mark, without which none is genuine. It is very necessary to guard against imitations of this useful material, and to secure themselves against being supplied with these inferior articles at my price, users are recommended to see that every 10 ft. length of the Asbestos Tape purchased by them bears the Trade Mark.

BELL'S SPECIAL LONDON-MADE ASBESTOS MILLBOARD, for Dry Steam Joints, made of the best Asbestos fibre, is well-known for its toughness and purity, and is absolutely free from the injurious ingredients frequently used to attain an appearance of finish, regardless of the real utility of the material. Made in sheets measuring about 40 in. square, from 1-64th in. to 1 in., and ½ millimetre to 25 millimetres thick. Each sheet bears the Trade Mark.

The following copy of acceptance of tender refers to above:—

Department of the Director of Navy Contracts.
Admiralty, Whitehall, S.W., 17th May, 1884.

SIR,—I have to inform you that your tender for Asbestos Millboard has been accepted.—Mr. John Bell. JOHN COLLETT, Director of Navy Contracts.

BELL'S ASBESTOS EXPANSION SHEETING (PATENT).—This Sheeting is another combination of Asbestos with India-rubber, giving to the steam user the special advantages of both materials. The India-rubber Washer is protected from the action of heat and grease by an outer coating of vulcanised Asbestos Cloth, thus producing an excellent joint where expansion and contraction render other materials unserviceable. This material is admirably suited to steam pipe joints and every class of valve. Valves made of this material are very durable, as they are not subject to injury by oil.

BELL'S ASBESTOS BOILER PRESERVATIVE.—This useful mixture by absorbing the free oxygen that is in the water entirely checks pitting and corrosion. It also disintegrates incrustation so immediately as to prevent its adhering to the plates. Not only is a great economy of fuel effected by keeping boilers clean, but the risk of having the plates burned is thereby obviated. It has been computed that 1/16 in. thick of incrustation causes a waste of 15 per cent. of coal; ⅛ in., 60 per cent.; ¼ in., 150 per cent.

Thus the Preservative avoids the great risks which are inseparable from scaled plates, lengthens the life of a boiler, and covers its own cost a hundredfold by economy of fuel.

It is entirely harmless, and has no injurious action on metals. It can be put into the feed tank or boiler, as may be most convenient.

Sold in drums and casks bearing the Trade Mark, without which none is genuine.

BELL'S ASBESTOS YARN and SOAPSTONE PACKING for Locomotives and all Stationary Engines running at very high speed with intense friction.

Sandwell Park Colliery, Smethwick, 1st February, 1884.

To Bell's Asbestos Works.

DEAR SIRS,—I have much pleasure in stating that I have used your Asbestos Packing for the last 13 months for our large winding engines which are running night and day, and also for the fan, pumping, and hauling engines at the above Colliery, and during that period we have not used more than one-third the Packing we had formerly; and this I attribute to your Packing on account of its great durability and general excellence of quality.

I am, dear Sirs,
Yours faithfully,
THOMAS WINTER, Colliery Engineer.

ASBESTOLINE
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—THE BEST LUBRICANT FOR ALL KINDS OF MACHINERY ASHORE OR AFLOAT.—
2/3 Per lb.
1 LB. EQUAL TO 2 GALLONS OF BEST OIL.

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SAFETY FUSE MAKERS.

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SAFETY FUSE OF ALL DESCRIPTIONS SUPPLIED IN ANY LENGTH REQUIRED.

Original Inventors of Guttapercha Fuses.

Brunton's Taped Guttapercha Safety Fuse is the Best Fuse for use with Dynamite in wet ground. Fits the Detonator without unlapping.

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Patent Steel Trucks, Points and Crossings,

PORTABLE RAILWAY, STEEL BUCKETS, &c., &c.

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GILDERSOME FOUNDRY, NEAR LEEDS.

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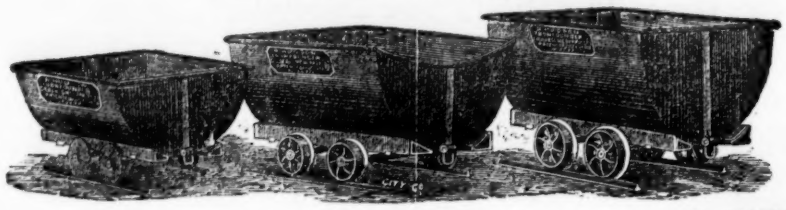
UPWARDS of 25,000 of these Trucks and Wagons have been supplied to the South African Diamond Mines; American, Spanish, Indian, and Welsh Gold, Silver, Copper, and Lead Mines; Indian and Brazilian Railways, and to Railway Contractors, Chemical Works, Brick Works, and Coal and Mineral Shippers, &c., &c., and can be made to lift off the underwork, to let down into the hold of a vessel, and easily replaced. They are also largely used in the Coal and other Mines in this country, and are the LIGHTEST, STRONGEST, and most CAPACIOUS made, infinitely stronger and lighter than wooden ones, and are all fitted with R. H.'s Patent "Rim" round top of wagons, requiring no rivets, and giving immense strength and rigidity. End and body plates are also joined on R. H.'s patent method, dispensing with angle-irons or corner plates.

Patented in Europe, America, Australia, India, and British South Africa, 1875, 1877, 1878, 1881, and 1883.
N.B.—The American, Australian, Indian, and Spanish Patents on Sale.

CAN BE MADE TO ANY SIZE, AND TO ANY GAUGE OF RAILS.

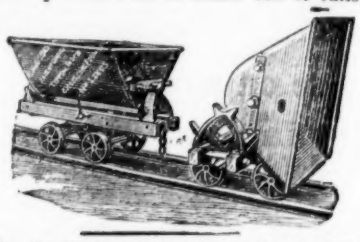
1.—PATENT STEEL END TIP WAGONS.

7.—PATENT STEEL MINING WAGONS.

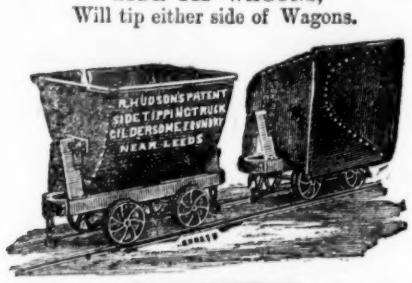


12.—PATENT STEEL HOPPER WAGON, WITH BOTTOM DOORS.

2. PATENT UNIVERSAL TRIPLE-CENTRE STEEL TIPPING TRUCK,
Will tip either SIDE or either END of rails.



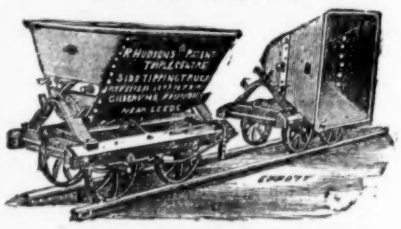
8.—PATENT DOUBLE-CENTRE STEEL SIDE TIP WAGONS,
Will tip either side of Wagons.



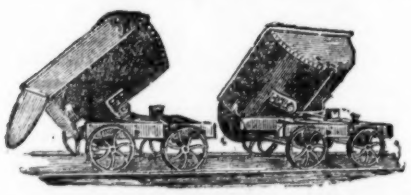
13.—PATENT STEEL HOPPER WAGON.

ONE man can EASILY tip ANY WEIGHT in these wagons.

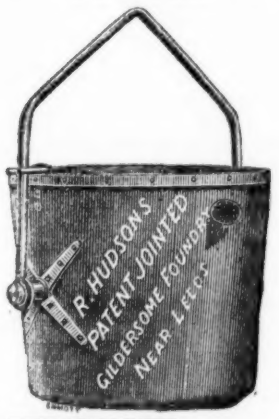
3.—PATENT TRIPLE-CENTRE STEEL SIDE TIP WAGONS.



9.—PATENT STEEL ALL-ROUND TIP WAGON.



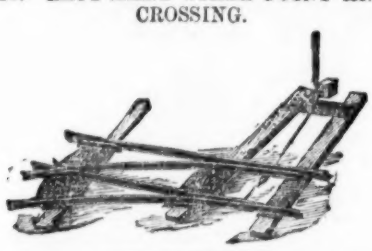
14.—SELF-RIGHTING STEEL TIP BUCKET.
(The "CATCH" can also be made SELF-ACTING if desired.)



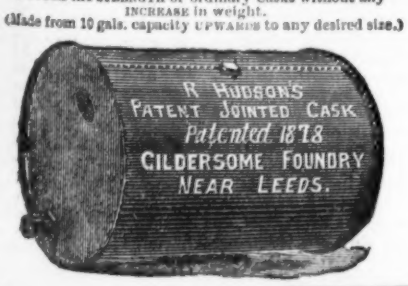
15.—R. Hudson's Patent Steel Cage and "Fallers," &c., complete.

4.—PATENT STEEL PLATFORM OR SUGAR CANE WAGON.

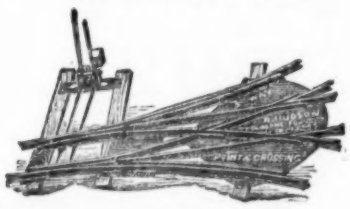
10.—LEFT-HAND STEEL POINT AND CROSSING.



5.—PATENT STEEL CASK.
As supplied to H.M. War Office for the late war in Egypt). DOUBLE the STRENGTH of ordinary Casks without any INCREASE in weight.
(Made from 10 gals. capacity UPWARDS to any desired size.)



11.—RIGHT AND LEFT-HAND STEEL POINT AND CROSSING.



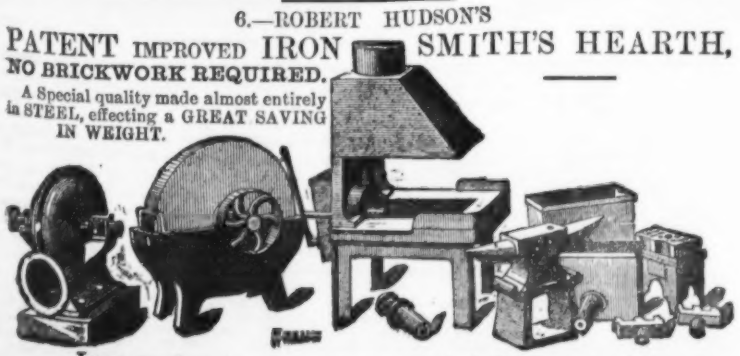
16.—PATENT STEEL WHEELBARROWS.
Made to any Size.
Lightest and Strongest in the Market.

A great success.

17.—STEEL SELF-CONTAINED TURNTABLE.

(Also made in CAST Iron for use where weight is not a consideration.

6.—ROBERT HUDSON'S
PATENT IMPROVED IRON SMITH'S HEARTH,
NO BRICKWORK REQUIRED.
A Special quality made almost entirely in STEEL, effecting a GREAT SAVING IN WEIGHT.



Large numbers in use by all the principal Engineers in this country and abroad.

18.—"AERIAL" STEEL WINDING TUB.

Largely employed in the South African Diamond Fields.

No. 19.—PATENT STEEL CHARGING BARROW,
DOUBLE the STRENGTH & much LIGHTER than ordinary Barrow

ALL KINDS OF BOLTS NUTS, AND RIVETS MADE TO ORDER ON THE PREMISES

Pumping Engines for Mines, Water Works, Sewage Works, and General Purposes.

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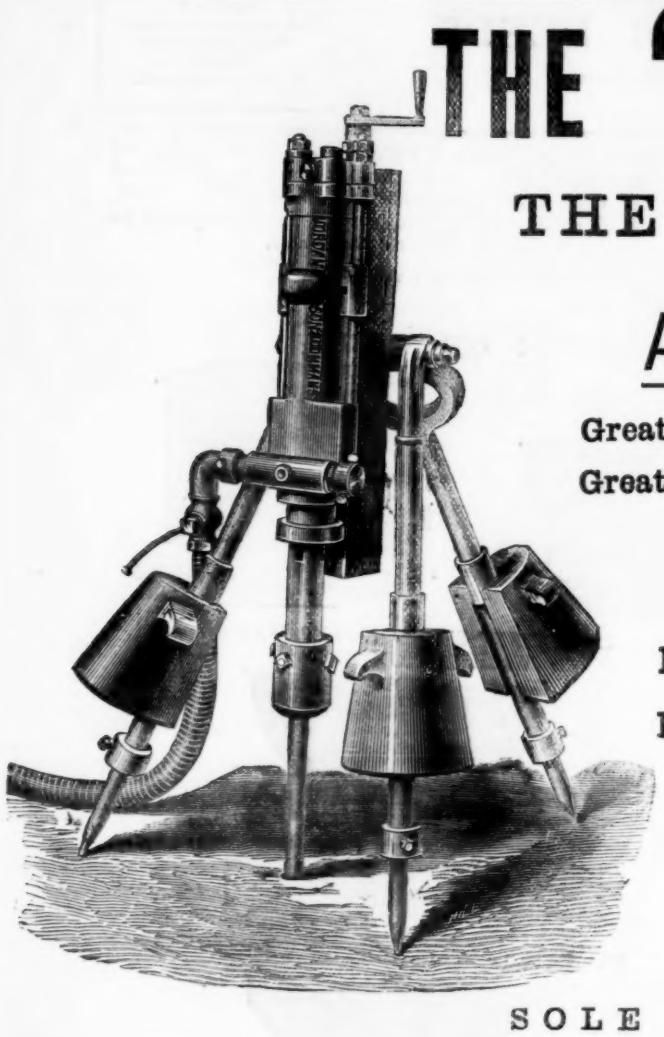

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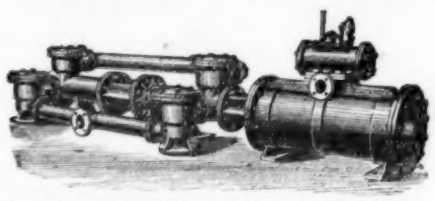

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COMMERCIAL FAILURES.

The number of failures in England and Wales gazetted during the week ending Saturday, March 7, was 99. The number in the corresponding week of last year was 64, showing an increase of 35, being a net decrease in 1885, to date, of 144.

The failures were distributed amongst the following trades, and, for comparison, we give the number in each in the corresponding weeks in 1883 and 1884:—

	1885.	1884.	1883.
Building trades	9	6	25
Chemists and druggists	1	—	1
Coal and mining trades	—	1	5
Corn and cattle trades	2	1	3
Drapery, silk, and woollen trades	14	6	23
Earthenware trades	—	—	2
Farmers	5	7	12
Furniture and upholstery trades	1	2	5
Grocery and provision trades	18	7	47
Hardware and metal trades	2	2	10
Iron and steel trades	4	5	8
Jewellery and fancy trades	2	3	13
Leather and coach trades	7	2	9
Merchants, brokers, and agents	9	6	29
Printing and stationery trades	2	2	1
Wine, spirit, and beer trades	11	8	27
Miscellaneous	12	6	29
Totals for England and Wales	99	64	249
Scotland	20	18	19
Ireland	4	5	6
Totals for United Kingdom	123	87	274

The number of Bills of Sale published in England and Wales for the week ending March 7 was 264. The number in the corresponding week of last year was 247, showing an increase of 17, being a net decrease in 1885, to date, of 31. The number published in Ireland for the same week was 11. The number in the corresponding week of last year was 19, showing a decrease of 8, being a net decrease in 1885, to date, of 47.—*Kemp's Mercantile Gazette.*

SUAKIM-BERBER RAILWAY.—Some considerable dissatisfaction having been expressed in Parliament in consequence of an order for pumping engines in connection with this railway having been given to an American firm, it is satisfactory to know that, although this is the case, yet the order for the boilers, of which large numbers are required, has been placed with the well-known firm of ROBEY and Co., engineers, Lincoln, who have already delivered the first dozen, and are now sending them forward at the rate of two per day, and will continue to so deliver them until the contract is completed. Messrs. Robey and Co. have manufactured large numbers of boilers for similar purposes, which have for many years been satisfactorily at work in the Caucasus and other parts of Russia.

ASTHMA, CONSUMPTION, COUGHS, COLDS, AND BRONCHITI RAPIDLY CURED BY DR. LOCOCK'S PULMONIC WAFERS.—Nurse Shoemith, Chilmark, Salisbury, writes:—"I don't like being without the wafers, and only wish every other nurse, as I do, could keep a store in hand, they would save much suffering in life; let alone the boon of having a reliable medicine in need. I could send you some particulars of cures, &c., &c." They instantly relieve and rapidly cure asthma, consumption, bronchitis, coughs, colds, shortness of breath, phlegm, pains in the chest, rheumatism, and tastes pleasantly. Sold at 1s. 1½d. and 2s. 9d. per box.

Original Correspondence.

MODERN v. ANTIQUATED MINING.

SIR,—As an instance of the great advantages of opening a mine quickly by the aid of the rock-drill it will not be uninteresting to many to consider the present position of a highly promising tin mine, which some years ago set aside a plant of this sort. Very recently a good discovery of tin has been made and opened out in West Frances on the Great Flat lode, close to Wheal Grenville boundary, and this lode underlies into the latter mine, which rejected the drill some years ago after a short trial. But it is easy now to see most distinctly if it had been continued the mine would now have been in a very flourishing condition. West Frances and South Condurrow join it on the north, and South Wheal Frances and South Condurrow on the east and west. It has always been very desirable to push Wheal Grenville workings eastward, as the ore in South Wheal Frances has always been of much higher grade than in the former mine, and very much to be regretted, since the discovery in West Frances that it has not been pushed on more vigorously, as the pioneer level in Wheal Grenville, the 150 fathom level east, is still a considerable distance from this new discovery, which when reached, will enable them to greetly increase the dividends—this course of ore yielding 130 lbs. tin to the ton, whereas Wheal Grenville only yields about 60 lbs. to the ton, and the latter with its greater depth may naturally be expected to find it better still, and especially so as the rich course of tin discovered in South Wheal Frances some years ago was about the same depth as the pioneer level in Wheal Grenville, and it is of the highest importance that this level should be pushed on with the drill, as well as some of the deeper levels, and the sinking of the engine-shaft.

I am aware that many objections have been made to sinking with the drill, but many obstacles have been overcome and high rates of sinking attained by its use; and, considering that every time the least thing interferes with the drainage the water accumulates at the bottom and interrupts the sinking, until it is got out again, one would naturally conclude that this machine was the very thing needed to make up the lost time; but, unfortunately, in Cornwall this has not been acted on, and the consequence is it averages a slower rate of sinking than any other important mining district; and, on the face of this, Cornish miners, one and all, are ever asserting that good tin mines can only be reached by great depth, and hence the importance of sinking fast. One great objection to sinking with the drill is, that powerful blast often breaks the pump, forgetting that, though the drill may be used to expedite the drilling of the holes, that it is not compulsory to blast several holes at a time—in fact, they can be blasted in precisely the same way as when bored by hand; but this is a very slow and expensive way compared with simultaneous blasting, and the difficulty has been surmounted by having the lower parts of the sinking pumps made of gun metal, which 8 or 10 sinking or sump holes, blasted simultaneously, does not injure in the least.

I have intimated that fanaticism prevails and prevents improvement coming into use, and I will now endeavour to point out further baneful results arising out of it, and the financial mismanagement. It is notorious that several mines have paid great dividends, and are now making calls, and struggling on with old fashioned, and in many instances worn-out machinery, whilst others have invested their capital in old-fashioned machinery, and cannot now afford new, and, consequently, are working at a great loss, and mining is said to be in a very depressed state, which is generally attributed to the low price of metals; but this cannot be said of tin, which is about a fair average price, and the loss is more to be attributed to antiquated notions than anything else. For it matters little which department one looks at, there seems to be the same lack of skill and economy, which I fear, if persisted in, will exterminate that ancient industry of the county, which has the honour of being the founder of mining in the colonies and many other countries, the Cornish miner being well known and esteemed all over the mining world as long as hand labour prevailed; but I am sorry to say since machinery has been brought into more general use they have fallen very far in the rear, the Germans and our American cousins having taken the lead entirely out of their hands.

I have no doubt that my Cornish cousins will think my expressions rather strong; but I assure them that they are made in good faith, and with no other desire than to direct their attention to a very serious matter—the momentous question of standing or falling in the sharp competition, and prodigious rapidity with which labour, ore, and time-saving appliances are being brought to bear. If we look back 25 years, and consider the very rapid progress inventions have made, one can but wonder what the next 25 years may bring forth, and how Cornwall will figure in the world then, assuming that new inventions will receive the same courtesy there during the next as it has during the past quarter of a century. It happens somehow or other, and I am ashamed to say so, that although such wonderful changes have been wrought outside, Cornwall and many other places remain unchanged, with few exceptions in the way of improvements, whilst in one particular instance especially, they have retrograded in the most important branch of the industry, the duty of the pumping-engine having fallen about 50 per cent., which, with other matters, will receive careful investigation in my next.

I am fully aware that they are now so financially hampered that they cannot help themselves without sweeping changes. In fact, they are many of them like one stuck in a bog—the more they pother the deeper they sink. The first great change and the foundation of the whole is, a better financial system by the introduction of Limited Liability or other companies (the merits of which I shall revert to hereafter), with more engineering and mechanical skill, and better discipline in the management; doing away, as in the army, with the cursed practice of buying a commission, as it were, to direct the execution of work they have many of them never seen before, and the rest of them quacks.

If an Act was passed that only cetificated managers, as in the coal mines, should have charge of mines, there would be an exodus of mine managers sufficient to recruit the army in the Soudan. What the total loss of life and money is every year, caused by their barefaced ignorance, I do not pretend to say exactly, but in my short experience of 25 years I have known thousands killed and maimed, and a very great many companies ruined by them, and until there is legislation to that effect, this barbarity will continue in this our so-called highly civilised country, and that is going on whilst the Government are making prodigious efforts to suppress barbarity abroad, and neglecting that at their own doors which could be stopped in a few minutes, and without loss of life or an extra tax on the widows and orphans.

I have no doubt under judicious management Cornwall will be restored to her former position of the world-famed producer of fish, tin, and copper, and even iron and silver-lead, of which there is, according to our best authorities, still an abundance, only requiring prospecting to be found.

I may remark to this, but will at present pass on to defective machinery. I intimated in my last that the ores are unnecessarily pulverised, and consequently float away in the water. The Cornish stamps, which is the principal pulveriser in use, in the tin mines especially, is the same now as it was 100 years ago, and may be described as an old-fashioned steam-hammer, consisting of a junk of iron ½ ton weight, which is lifted by a cam on a revolving drum about 10 in., and allowed to drop on the ore, which is admitted under it, with water. This crushes effective enough, and, as will be seen presently, too effective. The small perforated plate placed in front of each hammer for the exit of the pulverised ore is the great defect, confining the ore too long under the hammer, and the chance of its escape by splashing against the perforated plate is extremely hazardous, and although the ores may be crushed fine enough to pass through the holes, the greatest part of it strikes the dead part of the plate, and rebounds back under the hammer, receives an unnecessary blow, and is splashed to the plate again, crushed much smaller than the holes it was intended to pass through, givir g it another chance to strike the bull's eye and jump out, but the most of it again strikes the dead part of the perforated plate and rebounds again under the hammer to be still further mutilated, and how many times this is repeated we can only guess—may be 100 or may be 1000 times—and this is the secret of the unnecessary pulverising, and of the tin floating down the Red River and into the sea, as a large percentage is pulverised so exceedingly fine that it is practically impossible by any known process to arrest it. Besides this, the Cornish stamps are most cumbersome, heavy, and expensive, giving unsatisfactory results in every respect, the stamps axles for large stamps weighing from 40 to 80 tons. This great weight has been reduced in America and elsewhere considerably, and can be maintained only in Cornwall by the proximity of the foundries to the mines, as no one would attempt to send such a ponderous thing any distance.

Amongst the various systems of crushing lately introduced to the public that of Mr. H. R. Marsden, of Soho Foundry, Leeds, is generally approved and adopted, having taken the prizes in every case, and in comparison to the Cornish stamps is just like a mouse doing the work of an elephant, which combined with the improved German automatic dressing machinery, manufactured also by Mr. Marsden, is the most effective in the market, and economises 75 per cent. of the labour, a great percentage of the fuel, and does away altogether with the shameful waste of slimes so much and so justly complained of. This plant is made to suit all kinds of ore having a specific gravity greater than the matrix with which it is associated. And it is to be hoped that the same objection will not be made to it in Cornwall as was made to the wire-rope when it was first brought out. Chains were used for hoisting in Cornwall for many years after it had been superseded by wire-rope everywhere else, and it affords rather a striking example of the appropriatness of the term "One and All" to the Cornish. The small mines follow the example of the large ones, and the leading mine then was managed by an old man who to his death resisted the wire-rope, although often pressed by his son, who succeeded him, and who immediately the way was clear adopted the wire-ropes, and the other mines followed suit, "One and All," just as a flock of sheep follows the leader when he breaks a fence. How many tons were lifted during this time unnecessarily can only be approximately guessed. The excess of weight of chain over the wire-rope was from 3 to 5 tons, according to the depth of the mines, lifted a height of 600 ft., about on an average 100 times per day. Taking 4 tons as the average excess of weight it gives 240,000 foot tons lifted unnecessary every day in each mine of any importance. Nor was this all. The chains were constantly breaking, and the kibbles falling would often smash the fixtures in the shaft to shivereens, and make its way into the engine-shaft, sweeping everything before it, and the samplings and dividends would be put off for a few months until this was repaired.

MECHANICAL MINER.

THE ECONOMICAL REDUCTION OF COPPER ORE INTO METAL.

SIR,—In spite of the extended use of copper in various manufactures of late years, and the decreased stocks of the merchants, the price has continued to fall during the last two years, until it has reached a point which will oblige many mines to suspend operations unless the managers avail themselves of the latest improvements for economising labour in all departments of mining, dressing, and especially in smelting the ores at the mines, the same way as in use in America.

The cause of the decline in price is not difficult to discover if we turn our attention to the extended development in copper mining, and the appliances for dressing and smelting ores that have been adopted in America and elsewhere during the last few years.

Before the days of extended telegraph communication with far distant countries, merchants were obliged to keep large stocks of metal on hand to meet the various demands of trade and fluctuations of speculation; but this is now no longer necessary, as every morning telegrams arrive from all parts of the world, informing them of the exact number of tons shipped to every port, and they operate accordingly, without the necessity of keeping on hand large stocks.

In vain the metal brokers in their circulars comment on the decreased number of tons in hand as against the stocks of previous years, and argue in consequence that the price should go up; but it only continues to fall, showing that no reliance is to be placed on this fact, owing to the altered state of affairs as mentioned above, and that in all probability the stocks kept in hand in future by the merchants will continue to decrease instead of increase to that of former years.

The rapid extension of railway communication in the Western States and Territories of America led to the discovery and working of large deposits of carbonate and oxide ores, and although these ores were very rich, yet the enormous distance they had to be carried by railway to the smelters, in some instances from 1000 to 1500 miles, almost prohibited their being profitably worked unless they could be smelted into metal at the mines.

The erection of the old costly style of smelting in a reverberatory furnace, built of fire-brick, with its expensive repairs, great waste of heat, and large consumption of fuel (which at some of the American mines costs as much as 8*l*. per ton) was out of the question, and obliged mining engineers to turn their attention to inventing a more economical furnace for the treatment of these minerals into metal.

This has happily resulted in the manufacture of an iron furnace, surrounded by boiling water to keep it from melting, and known as the water-jacket furnace. This furnace is an adaptation of the well-known cupola furnace, which has for a long time been acknowledged by all smelters to be the most economical system for reducing ores into metal, because the fuel is consumed in direct contact with the ore. The water-jacket cupola furnace is upright in form, resembling a Cornish boiler set on end, automatic and continuous in its action, does not require any expensive fire-brick lining, and, in consequence, few or no repairs, reduces labour to a minimum, and consumes but little fuel.

The fuel (coke) is mixed with the ore, varying from one-seventh to one-tenth of the former to the weight of the latter; and, in consequence of the fuel being consumed directly in contact with the ore, the latter is subjected to the most intense heat; and, as the gases or flames pass on their way upward through the mineral, nearly all the heat is absorbed by the ore, instead of passing off in a flame out of the top of the chimney (as is the case with other furnaces), thus economising fuel, and also utilising the latent heat of the decomposed sulphurets.

Carbonate and oxide ores, as they come from the mine without dressing, are easily converted into metal of 96 per cent, in one operation, with the small loss of under 1 per cent. in the slag.

Sulphuret ores, however, require to be first roasted in a kiln to drive off the excess of sulphur, then smelted by the water-jacket furnace into rough copper of 50 per cent., and again re-smelted into metal of 94 per cent. The use of the water-jacket furnace is not confined exclusively to copper ores, but is equally applicable to lead and other minerals.

The following brief description of a reverberatory furnace generally used will at once show the great difference between it and a cupola water-jacket, resulting in favour of the latter. A reverberatory furnace is built of fire-brick, bound together with iron ties fastened with clamps and wedges. It has a separate fireplace, with a hearth on which is placed the ore, situated beneath a low vaulted roof, attached at one end to a tall chimney. The flames originating in the combustion of the fuel follow the contour of the roof of the furnace, and being carried forward by the draught generated in the chimney, sweep over the hearth, on which is placed the ore, acting upon and bringing about chemical changes in the same. The flame, whose natural tendency is upward, rebounds, or is reverberated from the surface of the roof of the furnace upon the metalliferous mass below, and hence the name of this class of furnace. These furnaces are in general use for all stages of copper smelting, roasting, oxidising, and reducing the ores into metal. They are expensive to build, especially where fire-bricks are scarce and dear, require frequent repairs, and consume a large amount of fuel needlessly, and in consequence of the flame only passing over the surface of the ores as it rushes away up the chimney only a small percentage of heat is given off and utilised in the fusion of the ores.

To reduce copper ores (sulphurets) into metal by a reverberatory furnace six separate processes are necessary:—

1st.—Roasting or calcining the ore, by which a portion of sulphur and other volatile ingredients are driven off.

2nd.—Smelting the roasting ores into rough copper of about 35 per cent.

3rd.—Calcining or roasting the rough copper by process No. 1, by which more sulphur and other impurities are driven off as gas, and the iron and copper remaining becoming partly oxidised.

4th.—Melting this calcined and partly oxidised metal into a product containing about 60 per cent. of metal.

5th.—Roasting the latter, by which copper of 95 per cent. is obtained,

6th.—Refining the 95 per cent. metal into malleable, pure, or merchantable copper.

By a comparison of the processes required to reduce ores by the action of the two furnaces now described, the immense superiority and economy of the water-jacket will at once be seen.

As the water-jacket cupola furnaces are made of iron can be easily erected, requiring no extensive scientific knowledge or suspension, it is to be hoped some enterprising mine manager will see his way to try this economical and highly profitable system of smelting at some of the Cornish mines, and thus successfully compete with the output of America by adopting the same successful appliances, and so keep the mines of England at work in spite of the present low price of copper.

Furthermore, the Cornish miner need not despair of the future, because he possesses and works the lodes containing sulphuret ores; whilst many of the so-called mines in America and elsewhere are only superficial deposits of carbonate and oxide ores that will be exhausted in a few years, whereas the Cornish mines will continue to be worked in the future for centuries, as they have been in the past.

London, March 11. T. A. MASEY.

P.S.—In another letter I will explain the latest improved mechanical appliances in use abroad for economising labour in dressing copper ores.

FORMATION OF MINERAL VEINS.

SIR,—Unexpectedly I have had the pleasure of looking over a copy of the *Mining Journal*, of Sept. 13, 1884, and have read the letter written by Mr. John Lean, upon the very interesting important subject of the formation of mineral veins. That letter criticises at considerable length the new definition of mineral veins propounded by Dr. Foster—"A mineral vein or lode is a tabular mineral mass formed more or less entirely subsequently to the inclosing rocks," but I should be inclined to call it an ill-founded assertion and not a definition, and in the absence of tangible proof of the particular mode in which the granite rocks were changed into metallic tin, the idea contained in the proposition of Dr. Foster must remain as so many words possessing no meaning. Why did not someone ask how it was that the whole mass of granite was not changed into tin at the same time? The fathers of the science of chemistry studied and worked hard with a view to obtain or discover the secret of the philosopher's stone and Elixir de la Vida, by means of which they believed that all the baser metals could be changed into gold, but we are not informed that it occurred to them that the rocks themselves had been changed, or were capable of such transformation by the mysterious elements such as those which they sought to discover. Perhaps, however, as the new definition is placed in a nut shell, Dr. Foster may hereafter have the good fortune to crack it, and give us a taste of the kernel, a thing highly desirable. Who can tell that he has not discovered the secrets of the alchymists, and consequently must be aware where in Nature this universal metamorphic element exists, and also how and when it came into action, commencing, of course, with the granite rocks. Taking this as a basis it is not too much to expect that the particular details of his definition—too precious a thing to be revealed at the first rehearsal to an ordinary cluster of scientists—will be forthcoming for our future benefit. Bueno! vamos a ver. When we find another class of philosophers, mere readers of books, propagating by their writings the virtue of the divining rod in 1884, such as it was believed to have when Agricola wrote his Latin book on mining and metallurgy about the year 1510, I believe there is certainly much excuse for the idea of Dr. Foster.

In a country like this where much ignorance abounds, and everything is roughly in its infancy, or even in Spain where everything is in wilful darkness we may expect to find absurdities and confliction in opinions tan grandes, but to find similar anomalics in an enlightened and progressive country like England, possessing as she does by her intelligence sufficient power to dominate the entire world, we must not feel surprised if foreigners should treat us with ridicule—"Pero, considerando que hay tantas ideas en conflicto en el mundo civilizado, tanto como en los paises que no tienen tantas pretensiones, no se puede hacer mas que esperar una mejoria en las cosas." It is not by mere agitating the question, delivering a fine worded lecture before a gathering of scientists, and writing a few letters that a correct solution of this grand problem of Nature is ever likely to be solved, but by a long, patient, practical, and scientific study of the mineral veins and rocks themselves.

After having devoted much time to the particular study of the formation of the mineral veins of England, Spain, France, and other parts of the continent of Europe, as well as those of Australia and other foreign parts, I am not prepared to believe, much less assert, that granite rocks have been so changed, or that it is possible that they could be changed into tin, neither is it clear that with all the light which science and practice affords it is possible at this moment to propound a theory of the formation of mineral veins capable of meeting the necessities of the case, and of explaining in detail all the phenomena which presents itself to the student of Nature's laws. Up to the present everyone who has taken this question in hand has failed in one way or another.

In former years I had satisfied myself upon many points connected with this subject, and during two years which I have devoted to the study of the silver, copper, and other mines, mineral veins and geology of two of the principal mining provinces of the Argentine Republic, South America, everything which I have seen confirms my former idea upon the formation of mineral veins. For such an object as this the study of the mineral veins of any single mining district is not sufficient, because it cannot be expected that all the conditions are present which the student should consider, in fact a long life spent upon this study alone, and in all parts of the world, if that were possible, would only yield sufficient light to enable us to raise the curtain of the sublime portals of creation, and to obtain a faint view of the truth.

Frequently I have come in contact with celebrated foreign *sabios*, philosophers of different schools of thought, and whenever this particular subject has been discussed I have invariably put the question—From whence came the elements which entered into the composition of mineral veins, what were their original form and condition, and what is the nature of the alterations which they have undergone during past geological epochs? But I regret that I have never been able to obtain a direct and satisfactory reply, for the reason that some confusion and confliction of ideas always arose. When these questions can be answered or solved like a mathematical problem to a demonstration then the mode in which mineral veins have been formed will no longer remain in so much doubt and mystery as at present.

In but few cases is it possible to find any given class of mineral pure in quantity, generally mineral veins contain mixed elements—for example, in the silver mines which are found in the Cerro Negro of the Famatina range of mountains in this province, I have frequently found by quantitative analysis as many as 17 elements—Silver, gold, iron, zinc, nickel, cobalt, lead, antimony, oxide of manganese, copper, sulphur, alumina, lime, siliceous insoluble matter, oxygen, and water; but sometimes some of these elements are absent, and replaced by others such as arsenic, &c. The determination of the mode of the formation of mineral veins requires, therefore, that we should be able to account for the process of these combinations, and of the original form of, and from whence each was derived. One cannot believe

absolutely in a thing which has never been proved however logically set forth, and for that reason that it was only by a certain chemical process that the valueless matter was removed in order to give place to that which was valuable is a theory which does not satisfy the necessary conditions of the case.

Perhaps Mr. John Lean will not take offence when I state that I cannot endorse his views in reference to the case of the two mineral lodes which he cites as having opposite inclinations, because he entirely overlooks the very important circumstance of difference of age which really exists between mineral veins of the same nature. This difference in the age of the formation of each mineral lode cannot be thus set aside, and it becomes necessary to consider and determine this difference before arguments such as those of Mr. Lean has adduced can have effect. The lodes to which he refers may not of necessity have been formed simultaneously, and their opposite inclinations seem to me to be evidence that they were not, and, consequently, there is no need to produce arguments *en pro ó en contra*, in order to prove whether the fragments of the world which lay between the two fissures or that within the V would have fallen down or not before the mineral was formed, because Mr. Lean has to prove that the two fissures and lodes of mineral were formed at the same time. Unless he is capable of doing this the fissure theory, as I understand it, remains undisturbed.

The great distance from Europe prevents me from discussing this matter further at present, because I have no opportunity of following it up; but on my return to England, which will be shortly, I intend to publish my new work upon the geology, mines, and mineral veins of the Argentine Republic, and should time permit I hope to be able to devote a chapter to the subject under notice.

H. D. HOSKOLD, F.G.S., Civil and Mining Engineer.
Villa Argentine, Provincia de la Rioja,
Republica Argentina, Jan. 20.

DIVIDEND MINES IN VICTORIA.

SIR,—The pithy but practical reports and balance-sheets of two representative mines in this colony may be read with interest as a contradistinction of many similar documents of a long-winded character so often laid before English shareholders in mining companies, and which are full of explanations and excuses for extravagant and incompetent management.

The first is that of the Band of Hope and Albion Consols Company, Ballarat. The directors report says:—"For the half-year ending Dec. 31, 1884, the quartz crushed was 10,250 tons, yielding 9078 ozs. 8 dwts. 12 grs. of gold, equal to 17 dwts. 18 grs. per ton, 850 tons raised by tributers producing 530 ozs. 1 dwt. 4 grs., equal to 12 dwts. 9 grs. per ton, and 150 tons pyrites treated for 209 ozs. 11 dwts. of gold, equal to 1 oz. 8 dwts. per ton. At No. 10 shaft, level No. 11 has been opened at 1000 ft. in depth from surface. It is expected the lode will be intersected at about 120 ft. west from the shaft, and from the settled character of the country the directors feel confident the shoot of gold-bearing stone now being worked at No. 10 level will be found equally good at No. 11 level. No. 7 shaft has been sunk 160 ft., making the total depth 700 ft.; the country is hard, but as it is known to be approaching the middle cross-course running through the mine more favourable ground should shortly be met with."

"Seven dividends, equal to 17s. per share, have been paid during the half-year, amounting to 19,082*l.* 10s., and a credit balance of 5230*l.* 17s. carried forward to next half-year: 3367*l.* 10s. of which has been absorbed by the dividend of 3s. per share paid on Jan. 2, 1885."

"At the No. 9 shaft, on the Guiding Star line, 1400 ft. west of the No. 7 shaft, a winding-engine has been erected, and being prepared for development. The mine and machinery is in good order, and every effort has been made by the directors to carry out the work efficiently and economically." The directors are Messrs. D. Brophy (Chairman), W. Canning, C. M. Fisher, J. Whelan, and J. H. Williams, and R. M. Sargeant (manager).

The following is an account of the receipts and expenditure for the half-year and the general balance-sheet:—

RECEIPTS AND EXPENDITURE—HALF-YEAR ENDING DEC. 31, 1884.

Dr.		Cr.	
To balance last audit	£ 1,845 17 6	Dividend account	£19,082 10 0
„ gold sold	38,470 0 6	Directors' fees account	152 17 0
„ royalties from tributers, public crushings, &c.	1,363 3 8	Salaries	424 0 0
		Wages and contracts	10,147 6 11
		Working expenses	4,421 3 1
		Plant and general charges	2,220 4 8
		Balance	5,230 17 0
	£41,679 1 8		£41,679 1 8

GENERAL BALANCE SHEET—DEC. 31, 1884.

Dr.		Cr.	
To gold account (old)	£ 733,440 14 5	By claim and plant account	£ 448,310 9 9
„ gold account	381,643 16 9	„ dividend account	477,623 15 0
„ royalty account	3,606 16 9	„ titles' account	37,047 7 6
„ revenue account	127,442 9 2	„ directors' fees account	8,146 6 3
„ stock account	423 19 4	„ salaries account	13,490 6 5
„ battery and account	359 16 2	„ general charges account	15,690 15 7
„ public crushing account	4,423 6 1	„ interest account	295 1 10
„ chemical product account	75 13 1	„ wages and contracts account	124,437 6 5
„ capital account	2,345 0 0	„ working expenses account	551,787 15 10
„ No. 6 battery account	54 17 6	„ plant account	31,687 12 8
		„ balance	5,230 17 0
	£1,253,717 14 3		£1,253,717 14 3

The Egerton Company (Limited), near Ballarat, although not paying such high dividends as a few years back, still shows a fairly prosperous account. The directors report having "crushed 16,978 tons of quartz, yielding 3984 ozs. 1 dwt. 18 grs. of gold, and paid in three dividends 3125*l.*" The average yield of the stone for this half-year appears very low to former years, being only slightly under 5 dwts. per ton. Now, as the proceeds of gold was but 15,435*l.*, the dividends paid being about one-fifth of the gross product, shows evidence of careful management, and what profits can be realised by gold mining under economical and practical management.

In the half-yearly accounts of receipts and expenditure the proceeds of gold and other sources of revenue give 15,711*l.* 1s. 3d., while the chief items of expenditure are—in wages 8620*l.* 4s. 6d.; ironmongery, powder, and candles, 1130*l.* 5s. 9d.; dividends, 3125*l.*; other items and charges making up a total of 15,050*l.* 19s. The board fees are put down at 40*l.*; directors' travelling expenses, 39*l.* 0s. 6d. (the mine being about 16 miles from Ballarat has to be visited often by the directors.)

The general balance-sheet shows—Receipts of gold account, 591,280*l.* 7s. 6d., capital and other items making 687,252*l.* 0s. 3d. From which the chief items paid are—Dividends, 282,604*l.* 3s. 4d.; wages, 195,289*l.* 7s. 2d.; machinery and plant, 23,087*l.* 3s. 2d.; ironmongery, powder, and candles, 28,421*l.* 12s. 9d.; fuel account, 22,943*l.* 0s. 2d.; props laths (mine timber), 7007*l.* 16s. 6d.; lease and mine account, 84,214*l.* 16s. 1d.; law charges, 24,276*l.* 16s. 9d., other items making up the balance.

The law charges are a heavy item, in consequence of a prolonged suit at law in reference to defending the title at the commencement of this company's operations. Had it not been for this latter heavy cost one-half the entire production of gold from this valuable mine would have been paid in dividends.

The company has at last decided on sinking a new main shaft, and it is a pity such an important work had not been commenced several years back, at the time such big dividends were being paid, the expense of the work would not have been much felt then, and they would have had the shaft down over 1000 ft. by this time.

Having assisted at the opening of these reefs in 1855 I have always advocated the sinking of deep shafts and carrying on progressive work by sinking (say) not less than 100 ft. to 200 ft. every year, as I fully believe these lodes will be found payable 2000 ft. in depth, and probably more—at any rate, there is no proof as yet to show to the contrary. I can but think it would be judicious for the Egerton and Black Horse Companies to unite their forces, and make one main deep shaft answer for both companies. If the Egerton Mines would but effect an amalgamation, and sink a main shaft 2000 ft. with all speed, they could increase their shares, and place a portion on the London market with advantage. The Band of Hope and Albion Consols Company, with their vast field of operations and numerous shafts, might adopt similar measures. Such a policy would be advantageous to the companies interested, to the district, and mining generally; and as I know the history and value of both companies from their inception, I could confidently recommend such properties to the notice of British capitalists and investors in mining.

The establishing of a share register and placing a portion of the stock of some of the leading dividend mines of Victoria in London will lead to practical and profitable results; and the British section of shareholders would be assured that the mines they invested in would be under local supervision and experienced management, thereby establishing a confidence in Victorian mining investments not otherwise so easily attained. THOMAS CORNISH, M.E.

WEST KITTY.

SIR,—Various rumours, apparently without justification, being from time to time circulated about this property with the view to preying on the fears of the ill-informed and ignorant, if, indeed, there be any amongst the proprietary, and thus securing their interest in this sound, legitimate, and good dividend-paying undertaking at low rates, it may be interesting to your readers to be informed on the best possible authority—that of Capt. Vivian, the manager—that the bottom of this mine, the 84 fm. level, is at present worth ½ ton of tin per fathom. This level has been gradually improving for some time past, a point of the greatest significance and importance. Fact is stronger than fiction, and a word to the wise is sufficient. I enclose my card, and am— ONE WHO KNOWS.

London, March 11.

TREGONTREES AND OLD POLGOOTH CONSOLS.

SIR,—I am pleased to hear an excellent report from the above mines, which are thoroughly developing mineral wealth. They sold last week over 3 tons of tin to Messrs. Daubuz and Co., Truro. The prospects of the mines generally are reported to be excellent. The new lode recently intersected by cross-cut south from the deep adit is opening out valuable tin ground, which in this part by driving east and west of the cross-cut on this lode is laying open immense quantities of good tin ground for stoping (backs 40 fms.). The new management are to be congratulated for the very efficient and systematic manner in which they are opening up, and working the mines.—*March* 12. SHAREHOLDER.

NORTH WALES SLATE QUARRYING AS AN INVESTMENT.

SIR,—Your North Wales correspondent has evidently misread the reference in the recent article in the Journal on this subject to an instance of success, in which a share costing originally 50*l.* was sold for 900*l.*

The property referred to, as I read it, is in the Nantlle Valley, and is, I presume, the well-known Dorothea Quarry.

The Rhydd-dn slate district is not yet sufficiently developed to give such favourable results as that above quoted; but there is little doubt that the quarries already opened there have a successful future before them. VIATOR.

SHROPSHIRE LEAD MINES.

SIR.—It is reported here that the Snailbeach District Railway (narrow gauge) is likely to be extended, or a branch taken from it through the Stiperstones Hill. That Esquire Harrop, who owns a considerable estate on the south-east side of that hill is anxious that it should be constructed through his land, and that he has offered to invest a considerable amount in the undertaking, we most sincerely hope this will be gone into soon, and we would beg of Esquire Harrop, and all who possibly can, in any way to do all in their power to give employment to the poor miners, many of whom, and their families, are in a starving condition. A little is being done at several of the mines in the way of tribute; but as the adit levels, &c., near to surface have been allowed to fall in, and not been used for many years, there are many obstacles in this line to be overcome. According to your correspondent's view, as expressed last Saturday week, all efforts in lead mines must end in failure and loss, and the best we can do is to dream of the prosperous days of the past. Should such discoveries be made in any of the surface explorations, or near surface, as we have known, good profits may be made at the present price of lead, and we do not think all has been found yet, and there are several mines here that important trials can be made with small capitals, and would be a good speculation; and when the better prices come again the said mines would be worth large sums. MINER.

"THE PAR TIN."

SIR,—All points of operation here are being pushed on with commendable energy. This mine is so advantageously situated for working, and is in such a celebrated district (adjoining Wheal Eliza and Old Par Consols) that further comment on this point is unnecessary. The level driven on Old Par Consols main lode for over 100 fms. into the hill has laid open a large quantity of ground for the stamps. This lode in the winze sunk below the adit is 11 ft. wide, and by assay produces over 1 cwt. of tin to the ton of lodestuff. This is an important bit of mining news from such a district, and capitalists and investors should watch this district with more than ordinary interest, as I fully believe that at The Par they are at the point of making an important discovery. SHAREHOLDER.

March 12.

THE NEW RAILWAY BILLS.

The time for depositing petitions against the Rates and Charges Bills of the Railway Companies has now elapsed. No fewer than 280 petitions have been presented against the nine Bills in question, and of these memorials 86 are from chambers of commerce, trade, and agricultural; 100 from traders, agriculturists, and trade and agricultural associations; 85 from corporations and other local authorities; eight from railway companies, and one from a canal company. The greatest number of petitions is directed against the London and North-Western Railway Company's Bill, to which there are 55 opponents; 54 petitions have been lodged against the Midland Bill, 52 against the Great Western, 33 against the Great Northern, 32 against the North-Eastern, 18 against the Great Eastern, 17 against the London, Brighton, and South Coast, 10 against the London and South-Western, and nine against the London, Chatham, and Dover. All the above petitioners pray to be heard before Committee, and in addition, there are a great many bodies who have, by petition, recorded their objection to these schemes, without seeking to appear against them. Petitions have been lodged by the Derbyshire, Nottinghamshire, and Warwickshire Colliery Owners' Association, and signed by numerous traders and freighters, against the Midland, Great Northern, and London and North-Western Railway Bills, praying to be heard by counsel. We understand further that the proceedings on such petitions, should the Bills pass a second reading, will be taken up by the Mining Association of Great Britain.

BURIED ALIVE IN A MINE.—At Thurgoland, near Sheffield, is a small mine known as Crossing Main, worked by the proprietor, Mr. John Lewis, James Edderley, miner, and a boy named William Chapman, who is employed as "trammer." At 4 o'clock on Thursday afternoon of last week the three were at work when a quantity of "bind" fell. They fled to the pit mouth, a distance of 156 yards, but Mr. Lewis turned back for his tools, and was caught by a fall of roof which buried him all except his head. Edderley at once went to his rescue. Lewis who was able to speak, urged Edderley to get him out as rapidly as possible. The more Edderley dug, however, the faster fell the roof, and at length Lewis was completely buried. The boy Chapman gave the alarm in Thurgoland, and the miners employed in the surrounding collieries formed themselves into relief parties. Furthur heavy falls had occured, and for 36 hours the work was carried on unceasingly, but when Lewis was reached they found they were too late. The unfortunate man had evidently died from suffocation. At the inquest the verdict was Accidental Death!

A SCIENTIFIC VIEW OF THE COAL QUESTION.

It is well known that our stock of coal is not an infinite quantity, and cannot last an infinite period of time. Different authorities, and those who have investigated the subject, including a Royal Commission, have assigned different lengths of time during which our supply is likely to last; and, according to the most trustworthy authorities, it cannot be much less than 100, nor much more than 250 years. Our abundant store of coal, and its application to industrial purposes, has, says Dr. GEORGE GORE, F.R.S., in *Nature*, been one of the largest causes of our wealth and progress. It has not been by the mere existence of large quantities of coal in this country, nor entirely by the sale of coal to foreign nations, that so much of our wealth has been obtained, but largely by the circumstance that we were the first nation to apply coal to industrial purposes on a large scale, and in a great variety of ways. Other nations also possessing coal, perceiving the great success of this method, followed our example, have overtaken us, and have now rendered it increasingly difficult, year by year, for us to maintain our position as manufacturers. As also large quantities of coal, petroleum, and inflammable gas are continually being discovered and utilised in other countries, and it is known that the United States of America also contain nearly forty times as much coal as our entire stock, the time cannot be very far distant when our chances of maintaining even our present position among nations by means of our coal will be considerably less than at present. It would be wise, therefore, boldly to face this serious prospect, and consider by what means our national prosperity can be maintained as our coal diminishes in quantity and increases in price, especially as our population is continually increasing, and requires to purchase greater supplies of foreign food. There does exist another and inexhaustible source of wealth and progress—new knowledge attainable by means of scientific research. It is upon such knowledge, gained by experiments made to examine natural forces and substances, that we must sooner or later depend as a fundamental source of national prosperity. As fast as this knowledge is evolved by discoverers it is applied in more immediate practical forms by numerous inventors, and then manufacturers and men of business use those practical realities in the production of wealth. This has been the order of events in the past, and will be in the future; this was the way in which we got wealth out of coal. The practical value of new scientific knowledge as a source of wealth and progress is incomparably greater than that of all the coal deposits, petroleum springs, and gold fields of the earth. This great truth, though familiar to scientific investigators, is but little perceived or appreciated by our rulers, or by the mass of their electors; and the chief reason for this is the fact that they possess insufficient knowledge of science. Even Governments can only appreciate that which they understand, and can only act as circumstances and public opinion allow them, and when fettered by an ignorant population, are powerless to preserve a nation from decay. There cannot be a more complete error than to suppose that new knowledge discovered by means of scientific research is not practical. Its immense practical value has been abundantly proved in a multitude of cases. One of the most recent proofs of the practical value of such knowledge is the conversion of the heat of coal into electric current and light in the dynamo-electric machine and electric lamp; the entire existence of these instruments arose from new knowledge discovered in purely scientific researches by Davy and Faraday. It is not the mere possession of good things, but making the best and earliest use of them, that most conduce to success. Our great stock of coal lay comparatively useless as a source of national wealth until philosophical investigators discovered its constituents and properties, and inventors applied these to useful purposes; other nations also possessed coal, and our greater success than theirs was largely and essentially due to the fact that we were the earliest in applying it to important and varied uses. It is well known that a man who has no faith in medicine will not apply to a physician until death stares him in the face. Similarly, the average politician and the ordinary elector, having but little knowledge of philosophical experiments, or faith in them, will probably not believe in their great practical value until national distress and panic legislation ensue. The love of money also, and the desire of acquiring it quickly without commensurate sacrifice fostered by our having so easily obtained it by means of our coal and science, is so strong in this nation, that probably nothing but the actual loss of wealth in the form of diminished value of properties will induce capitalists and landowners to perceive and examine the scientific basis of their incomes. When, however, the stern reality of gradually increasing scarcity of coal, and consequent inability to pay for our great supplies of foreign food by means of that coal, and of articles produced by its aid, comes upon us, perhaps the statesmen and wealthy classes of this country will see the indispensable necessity of new scientific knowledge, and be more ready to promote experimental research, with a conviction that its practical results are vast, though not always direct or immediate.

IRON SMELTING IN ONTARIO.

The Canadian Board of Trade has unanimously endorsed the project of the Toronto and Nipissing Eastern Extension Railway Company and the Toronto Iron Company (Limited). The proposition of these companies is that they shall build 50 miles of railway from a point in the township of Snowdon, on the Victoria branch of the Midland Railway, eastwardly, *via* Irondale, Gooderham, and Cheddar, to Bancroft, Hastings Co.; that they shall erect a charcoal blast furnace at Irondale, township of Snowdon, capable of making 30 tons of pig per day; shall erect bloomeries in such remote locations as cannot be reached conveniently by railway, and shall permanently settle up and develope the country tributary to the railway. In return for these services the companies ask that the Provincial Government shall grant 5000 acres per mile on the first 50 miles of the road. They contract to build to the eastern line of Glamorgan within one year after the grant is made, and the remaining 30 miles to Bancroft within two years; to build the furnace at Irondale; and to deposit with the Government 25 c. an acre as guarantee that the lands shall be early and permanently settled. All this is offered to be done before the title in any of the land grant is vested in the companies. To carry out these plans will require the investment in the Province of between $1,500,000 and $2,000,000. One furnace alone would burn up 43,800 cords of wood a year, and would supply work for 70 men. The establishment of the works would lead to the settling up of the small patches of good land which are interspersed with the rocky, mineral bearing tracts, and would open up a country which, unless settled by some such means as this, will remain a wilderness indefinitely. Incidently the establishment of these smelting furnaces to the north-east of this site would probably lead to the building of rolling mills and large foundries in Toronto, as this city is the most advantageous in Ontario for the location of such industries. We cannot say what view the Provincial Government will take of this proposition, but if they determine to make the grant they will have the support of everybody who is not driven by the want of other political capital to attempt to make a little capital out of this. The land, as it lies, is almost absolutely worthless. The proposition now made is so guarded by conditions requiring work to be done before the title is vested, that, if the request of the company be granted, work must be commenced at ance. It will be the general feeling of the business men of the community and of the settlers in the neighbourhood of the tracts in question that the Government may safely make this grant, taking such guarantees as are offered and such others as may upon consideration be deemed necessary.—*Toronto Globe, Feb* 12.

Mr. T. ANGOVE, of Mount Pleasant, Camborne, died at his residence on Saturday afternoon. The deceased for many years represented in the purchase of ores some of the largest copper buyers in England. He was also influentially connected with the Rio Tinto Mines in Spain and other mines on the Continent. His death will be regretted in many mining and smelting centres. At Camborne he was for many years a Poor Law Guardian and lessee of the market

FOREIGN MINING AND METALLURGY.

There is very little news to communicate with respect to the French Iron Trade. Prices have not varied; at the same time, attempts which have been made to re-establish a quotation of 5*l.* 12s. per ton for iron in the Nord do not appear to have been attended with the least success. Prices have shown weakness in the German iron trade; at the same time, there is no appreciable change to report. The production of pig in Germany, in January, is officially returned at 319,801 tons, as compared with 280,062 tons in January, 1884, showing the large increase of 39,739 tons this year. The production of Thomas pig continues to exceed that of Bessemer. It may be interesting to add that the aggregate production of Thomas pig on the European Continent, in the 12 months ending Sept. 30, 1884, was 685,000 tons, or 179,000 tons in excess of the corresponding production in 1882-3. The imports of pig into the Zollverein, in 1884, were 264,501 tons; the imports of iron were 16,505 tons; and those of rails 682 tons. The imports of lignite into the Zollverein, last year, were 3,466,322 tons. The exports of pig from the Zollverein, in 1884, were 230,008 tons. Iron was exported to the extent of 151,005 tons; rails to the extent of 144,453 tons; and tyres and axles to the extent of 10,149 tons. There is nothing very special to report with respect to the Spanish iron ore trade; the general condition of affairs is, however, inactive, in sympathy with the current aspects of European metallurgy.

The Belgian Iron Trade has remained in much the same state. The condition of affairs is far from being brilliant; at the same time, the current of orders is sufficient to keep the works going. Quotations have experienced scarcely any change; it had been expected that some little advance would have been established in the rates current for pig, but the relighting of the Musson blast-furnaces will probably dissipate this anticipation, especially as Halanzy relighted March 4. At the same time, the tone of prices has been fairly firm. Contracts have been let for 2750 tons of Vignoles rails for vicinal railways; these contracts were shared by certain Belgian steelworks at relatively high rates. The Monceau Bayemont and the Chauw-à-Roc Collieries Company has been paying this month a dividend for 1884 at the rate of 1*l.* 1s. 8d. per share. The Produits Colliery Company has paid this month a dividend for 1884 at the rate of 3*l.* per share. It appears that at the close of 1884 the General Company for promoting the National Industry of Belgium had 225,432*l.* invested in various metallurgical undertakings. The dividends collected for 1884 upon this capital amounted to 2208*l.*, or at the rate as nearly as possible of 1 per cent. per annum. The colliery investments of the General Company stood at the close of 1884 at 1,025,393*l.*; the dividends collected last year upon this capital amounted to 27,314*l.*, or at the rate of about 2⅔ per cent. per annum.

The Belgian Coal Trade has not materially varied. The sales effected have been of about the ordinary importance, and previous quotations have been generally maintained. A strike in the Borinage, which had assumed rather alarming proportions, is stated to be subsiding. The strike has been attended thus far with very little violence, but still it is not altogether certain that tranquillity has been permanently restored. As a consequence of the strike in the Borinage, stocks of coal in the Couchant de Mons are stated to have been a good deal reduced. No important change in prices has occurred in the German coal trade. The production of coal in Prussia, properly so called, amounted in 1884 to 51,813,326 tons, as compared with 50,617,938 tons in 1883, showing an increase of 1,205,388 tons last year. The deliveries increased last year to 50,148,279 tons, as compared with 49,034,768 tons in 1883. The number of workpeople engaged in Prussian coal mining increased from 182,210 in 1883 to 189,379 in 1884. The exports of coal from the Zollverein last year were 8,816,850 tons, as compared with 8,705,000 tons in 1883, showing an increase of 111,850 tons last year. In the exports of last year the deliveries to Austria figured for 2,382,613 tons; those for France for 1,223,092 tons; and those to the Low Countries for 2,775,975 tons. The deliveries of German coal to Belgium in 1884 were 786,594 tons, while Switzerland took 573,461 tons, and Russia 323,016 tons. Italy figured as a consumer of German coal last year to the extent of 68,519 tons.

REDISTRIBUTION IN CORNWALL.

THE PROPOSED MINING DIVISION.

A public meeting of the inhabitants of Troon and neighbourhood was held in the Board School Room on Friday week last—Mr. J. PENGELLY presiding—to consider the question of the electoral boundaries. Resolutions were unanimously carried to the effect that in the opinion of this meeting the county electoral division, as first proposed with regard to Helston and Camborne, was much more satisfactory, geographically and every way, than the alteration as suggested by the Commissioners, and declaring that the mining interest is altogether a county interest, and would be more efficiently attended to by all the members of the county than if the welfare of miners was delegated to one representative only.

At a meeting held in the Druids' Hall, Redruth, on Saturday last, the Chairman, Mr. D. W. BAIN, said the original arrangements as to the districts were satisfactory to the majority of the people of Cornwall, and it was natural that unless a large amount of evidence of a different character were given at the meeting at Bodmin, the original scheme was expected to remain intact. Subsequent speakers thought that the district named the mining district had no right to be considered exclusively and solely the mining district, and it was also considered unwise to attempt class legislation, that the whole members of the county should be concerned in mining questions, as mining extends from one end of the county to the other. Ultimately the following resolution was carried, with only one dissentient:—"Seeing that the mining interests of Cornwall extend from the Tamar to the Land's End, this meeting views with extreme disfavour the latest proposal of the Boundary Commissioners to localise this industry to the East Penwith sessional division with the parishes of Gwennap and St. Agnes as an electoral district; and this meeting of the inhabitants of Redruth and neighbourhood is of opinion that a vast majority of those engaged in Cornish mining believe their interests will be better guarded by the whole of the Cornish members than by one specially elected representative. It is, therefore, urged that the original intentions of the Boundary Commissioners shall not be departed from, and that a copy of this resolution be transmitted to Mr. Borlase, M.P., for presentation to the proper quarter."

On Monday evening a meeting was held under the presidency of Mr. W. H. P. MARTIN, at the Town Hall, Truro, when Mr. HEARD proposed "That this meeting of the electors of the City of Truro strongly disapproves of the boundaries of the new Truro and Camborne divisions as not being settled in accordance with the main instructions laid down for the guidance of the Boundary Commissioners, such boundaries neither securing the compactness of the said divisions nor fully securing the separate representation of the mining industry of Cornwall; and that in the opinion of this meeting the divisions of Truro and Helston, as originally proposed, would be much more compact and much more acceptable to the general body of electors.—Mr. N. W. NORTON seconded the motion.—An amendment was proposed by Mr. JACOBS, and seconded by Mr. S. HOLLOWAY, to the effect "That this meeting approves of the Redistribution scheme at present before the House of Commons as far as this constituency is concerned." On being put to the vote the amendment was lost, and the original motion carried by a large majority.

A public meeting of the inhabitants of Helston was also held on Monday, in the Guildhall, when Mr. T. HEYNES occupied the chair. In his introductory remarks he considered there had been no improvement by changing the original mapping out of the Helston district. The arrangement made at first was by far the most convenient for the electors. By the proposed alteration the electors would not be able to meet together and consult, and they did not like being tacked on to Truro. They preferred to preserve their independence. Truro was 27 miles from the Lizard, and he thought they ought to combine to secure their proper representation.—Mr. G. J. CUNNACK then moved the following resolution:—"That this meeting expresses its great disappointment at the severance of the Boundary Commissioners of Helston and Camborne Parliamentary division. The common interests of these towns and their neighbourhoods qualify them for united political representation, and the railway from Helston to Camborne, now about to be completed, will still more clearly bind the two districts together. This meeting is strongly of opinion that the union of Helston with Truro will give rise to very serious inconvenience, and if the circumstances of the districts had been fully laid before the Commissioners at Bodmin the alteration of the Truro and Helston divisions would not have been recommended." The motion having been seconded was put to the meeting and carried unanimously.

MOVEMENTS IN COPPER DURING 1884, AND FORECAST FOR 1885.

FROM AN AMERICAN POINT OF VIEW.

Messrs. LEDOUX and RICKETTS, of New York, write:—The annual circulars from the large English metal brokers have come to hand, and the statistics of production and consumption in this country have been completed for the past year as accurately as the data at command will allow. The result as it applies to copper exhibits a steady decline in available stocks in the face of a rapid increase of production. The increase of production has, however, attracted more attention than the increase in demand, hence the panic among speculators and the backwardness among buyers which has driven down prices, despite the favourable aspect of the market, to a figure far below any ever before reached in the history of the copper trade. Ever since this country became a large exporter prices have of necessity sympathised more sensitively with foreign prices than before. The first close approximation to the prices of the world occurred in the spring of 1883, when copper suddenly dropped from 18 c. to 15 c., and our copper found a better market abroad than at home. Since then our market was slightly more favourable to the seller of pure copper than the foreign market was, until the Lake companies and the Anaconda owners made large sales abroad, based on the fluctuating prices of Chile bars and best selected, and the Lake pool still further assimilated our market with that of the world by basing their home sales on the price of English best selected. Henceforth, therefore, we must accept the quotation of the European market as our own, while, on the other hand, our own production is going to be the most important factor in the calculation on which future European prices will be determined.

We now stand at the head of producers, the principal of which turned out as follows:—

	1883.	1884.
United States .....*Tons	57,756 ...	71,662
Chili.....	46,229 ...	48,994
Spain and Portugal (imports into Great Britain)	44,367 ...	41,087
Australia.....	10,673 ...	11,561
Cape Colony	6,693 ...	7,502
Venezuela (New Quebrada Mine)	4,069 ...	3,673

In spite of this enormous production the apparent stock on hand in England was at the end of 1884, 39,793 tons as against 41,269 tons in 1883. Even more remarkable, therefore, than the increase in supply has been the growth of demand.

The English returns show that the apparent consumption in England was—

In 1883..... 46,803 tons | In 1884 ..... 58,780 tons

The total English and French consumption, which was in 1880 only 114,598 tons, rose in 1884 to 153,108 tons.

It is not possible to estimate our home consumption, on account of the difficulties of even approximately determining the stocks that have for years been accumulating, but are known to have been now disposed of, since it has become certain that an artificial value can no longer be given to copper in our home market through pools, protected by a duty. New uses have been found for copper. Thousands of miles of telegraph wire have been made in this country during the year, and many tons of copper disposed of to the electric light companies, while never have the brass and copper rolling mills and brass foundries been busier in turning out staple goods. Notwithstanding this favourable showing the price of copper fell steadily in England with slight fluctuations from 58*l.* for Chili bars at the beginning of January to 51*l.* at the end of November, when it took a leap downward, reaching in the end of December the lowest figure ever recorded —47*l.* 5s. The decline was undoubtedly assisted by the action of the Anaconda and Lake companies making large contracts for future delivery. Prices here have sympathised with the European markets, but more acutely in the end than in the beginning of the year. Lake sold in January at 15 c., when Chili bars were 58*l.* = to $288·80 per ton of 2240 lbs., and at the close of the year Lake was 11 c. and Chili bars were 47*l.* 5s. ($230·03.) Unless the world's production goes on increasing at a more rapid rate than the world's consumption the available stock must go on diminishing, and prices rise. A review of the sources of the world's copper supply shows that:—Spain's production, which is the next greatest to our own, can be increased if there be profit in doing so. It is supposed that the copper of the three large Peninsular pyrites companies stands them at about 8½ c., crediting the copper with the proceeds of the sulphur and the iron residues. The demand for sulphur and its price have rapidly declined since the ammonia process of making carbonate of soda has been introduced, and the decline is likely to continue. The importation of pyrites into Great Britain fell off last year 37,000 tons. Should these collateral sources of manufacture to the pyrites companies fail the profit on copper only will be small, if any, and the inducements to increase production and use up ore needlessly will be removed. A large increase was threatened last year, but the returns show a falling off. Chili is maintaining her contribution better that was expected, but some of her old and big mines are deep and lean, and her supply comes largely from districts not profitable in the day of her greatest prosperity. There is no reason from advices we receive from there to suppose there will be any increase in the future from that quarter; but copper mining and smelting is so important an industry, and backed by so much capital that it will not succumb speedily to low prices. As it happens a favourable turn in exchange occurring contemporaneously with the fall in price broke the force of the blow, and the full effect of the depression has not yet been felt in Chili. The only other South American producer is Venezuela, where the New Quebrada Mines have been for nearly a quarter of a century a drain on their English owners, supplying the stock market with more promises than the metal market with copper.—The Cape mines will doubtless supply their annual quantum, but cannot on demand notably increase it even if the management wished to do so.—United States: Calculation therefore reduces itself as to what we ourselves will produce. From what we know of operations in the three centres of copper mining we should say that the level of production has for the present been about reached. Of the Lake companies the only one able to partially maintain the aggregate of profits by increasing production is the Calumet and Hecla. It has spare plant, and a mine opened far ahead of immediate requirement. It will probably show at the end of the year a production of 50,000,000 lbs. But the surplus from this mine will not more than cover the deficit arising from the closing down of several of the small mines. In Arizona no new mines of importance are being opened and no new furnaces built, while the four existing establishments are being run to their full capacity. In Montana, the Anaconda Works at Butte were in blast before the end of the year, though the full effect was not perhaps felt. The result of their operations will undoubtedly be to increase somewhat the production of Butte, but it will be most apparent in replacing the shipment of ore entirely by the shipment of furnace material. As in the south-west, so here, no recent discoveries of any magnitude have been made, and none of the running concerns have expressed their intention of immediately swelling their production. The outlook, therefore, for the coming year is:—That none of the old sources of supply will increase their output; that this country has probably reached the limit of its production if present prices prevail; that as stocks in this country are low, and abroad are rather below an average, the consumption has more than kept pace with production. And therefore, that unless the demand should fall off, the price must rise as soon as the market has recovered its equilibrium, disturbed by the rapid growth of production in this country, and the new basis on which copper is being sold.

* All quotations are in tons of 2000 lbs.

MUNTZ'S METAL COMPANY (LIMITED).

The following is the report of the directors to the proprietors, to be submitted to the twenty-second ordinary general meeting, at the Great Western Hotel, Birmingham, on Monday, March 23:—

The directors report that the profit on the past year's transactions is 19,815*l.* 19s. 6d., which, with the amount brought forward from last year's account—12,823*l.* 16s. 9d.—will make a disposable balance of 32,639*l.* 16s. 3d. The payment of an interim dividend at the rate of 10 per cent. per annum to June 30 last disposed of 8938*l.* 17s. 6d., The directors now propose to divide among the shareholders a further sum of 8938*l.* 17s. 6d., and write off 3000*l.* from stock fluctuation suspense account, leaving a balance to carry forward of 11,762*l.* 1s. 3d.

The company has recently acquired the sole right to a patent for the manufacture of tubular coils by a process which simplifies and cheapens their production. As the demand for these is large both at home and abroad, it is expected that the business done will be of considerable advantage.

The directors who retire are Mr. G. F. Muntz and Mr. W. Middlemore, who, being eligible, offer themselves for re-election. The auditors, Messrs. Turquand, Youngs, and Co, also retire, and are eligible for re-election. The dividend will be payable on and after April 1.—JOHN JAFFRAY, Chairman.

BALANCE-SHEET, DECEMBER 31, 1884.

Capital and Liabilities.

To shareholders' capital		£178,777 10 0
sundry creditors		53,304 18 11
reserve		5,369 7 11
rebate on bills and book debts		858 19 1
Profit and loss account:—		
Balance from 1883	£12,823 16 9	
Profit in 1884	19,815 19 6=	32,639 16 3
Total.....		£270,950 12 2

Property and Assets.

By land and buildings		£ 30,686 2 7
stock on hand, Dec. 31, 1884, at market valuation		134,739 15 9
machinery, tools, &c.		16,225 19 5
debtors		57,627 3 7
cash and bills in hand		9,154 16 5
stock fluctuation suspense account		22,516 14 5
Total.....		£270,950 12 2

PROFIT AND LOSS ACCOUNT.

To interim dividend at 10 per cent. per annum, paid October, 1884	£ 8,938 17 6
proposed dividend at 10 p. c. per annum for half-year ending Dec. 31, 1884...	8,938 17 6
stock fluctuation suspense account	3,000 0 0
balance to next year's account	11,762 1 3
Total.....	£ 32,639 16 3

We have examined the above accounts, and compared them with the books and vouchers of the company, and have found them correct.—Turquand, Youngs, Weise, Bishop, and Clarke, auditors.—Feb. 18, 1885.

THE OUTPUT OF COAL IN 1884.

A Welsh correspondent writes:—The output of coal last year is a matter much disputed. The men declare that it was in excess of the former year, and in Yorkshire the pending strike is largely based on this assumption. In order to clear up these difficulties, Mr. McLaren, the Member for Stafford, asked the Home Secretary a question on the subject. The Home Secretary referred the enquiry to Mr. Dickinson, Inspector of Mines at Manchester. The results are interesting and important, and are thus summarised by a gentleman who has been favoured with an opportunity of perusing them:—In Northumberland the output in 1884 was 7,516,000 tons, being a little over 11,000 tons short of the output of 1883. In Durham the output was 28,500,000, being 1,326,000 short. In South Wales and Monmouthshire the output was 24,838,000, being a little under 137,080 tons short. In Yorkshire the output was 19,220,000 tons, being 347,000 tons short. In Derbyshire the output was 8,581,000 tons, being 207,000 tons short. In Nottinghamshire the output was 5,000,000 tons, being nearly a quarter of a million tons short. In Leicestershire the output was 1,152,000 tons, being 172,000 tons short. In Scotland the output was 21,000,000 tons, being 39,000 tons short.

The above figures show that whilst Wales and Scotland have very fairly kept up the output, Durham has considerably fallen short, and Nottingham is reduced by 1-20th. The total output of coal for the United Kingdom and Ireland exhibits during the year 1884 a falling-off of nearly 3,700,000 tons.

THE AMERICAN METAL MARKET.

Messrs. MATHEWS and WEBB, ore and bullion brokers, of Denver, Colorado, write on Feb. 18:—General trade throughout the country still shows a lamentable tendency to drag heavily. The commercial reports shown by the clearing house exchanges of 25 large cities make a decrease of 30 per cent. in the business last week from the same week in 1884. The imports were $5,831,069, and the exports $6,425,455. The silver question still seems to be handled very gingerly at Washington. The President-elect will probably not favour farther coinage unless on some more equitable basis, and unlimited coinage can scarcely be looked for under any circumstances. There seems to be no bounds to the accumulation of the surplus reserves of money in the New York banks, which have now reached $54,985,125, and is approaching a point which will be three times the largest amount of any previous year. Commodities and dry goods have mostly ruled very steadily, and railroad stocks have commenced to show a slight improvement, especially in the line of the more reliable and interest paying roads; but freight matters are still in a deplorable condition.—SILVER has ruled lower.—COPPER shows every sign of having, for the present at least, touched its lowest range of prices. The best proof of this, perhaps, lies in the fact that the market price of the Calumet and Hecla stock has advanced of late steadily, and the price of copper has improved. At New York some 200,000 Lake sold at 11 and 11¼ c., although the pool, as a pleasant novelty, are taking in their supplies at the reduced price of $10·80 on their contract. Outside brands, such as Baltimore, Star and Oxford, have ranged from 10¼ to 11 c. The Old Dominion Company is reported to be running their mine at present most actively, with the prospects of a long run. In fact, the Territories seem undaunted by the low ruling rates, and continue to produce copper mattes freely.—LEAD has been quiet beyond all precedent, and the sales have scarcely been sufficient to establish the price; but the bid and asked figures have remained as fixed as the Rock of Gibraltar. Sellers at New York would not budge from $3·65 and $3·70 according to quality, and buyers stood firmly on $3·60 and $3·65, but did not obtain the lead. At St. Louis a like dogged obstinacy has been shown on both sides, and prices have been held at $3·45 for common, and $3·50 for refined; but the sales have been of the most limited quantities. The annual report of the Horn Silver Mining Company, of Utah, has appeared, and shows an expenditure for 1884 of expense at the mine of $1,447,000, and an outlay for dividends of $1,200,000, which makes a total of $2,647,000, and this is a deficiency of $197,000 from their total receipts for the year of $2,450,000. With characteristic prudence they have just passed their dividend. If these giants cannot earn any dividends at these prices, what will soon become of the vast army of pigmies?

A WINDING-UP petition in the matter of the Trojes Mining and Smelting Company (Limited) will be heard before Mr Justice Chitty on Saturday, March 21.

THE MONTANA COMPANY (LIMITED).

The following is from the final report of the Committee of Enquiry, to be presented at the extraordinary general meeting of the shareholders to be held on Thursday next. At a special general meeting of the shareholders of the Montana Company (Limited), held at the City Terminus Hotel, Cannon-street, on Wednesday, Nov. 19, 1884, Mr. N. STORY-MASKELYNE, M.P., in the chair, it was resolved:—"That a committee be appointed of not fewer than five, nor more than seven, shareholders of the company, to enquire generally into the past proceedings of the company, as well as its present position, and to report to an adjournment of the present meeting, on a day to be fixed by the committee, upon the measures, which, in the judgement of the committee, it would be desirable for the shareholders to adopt. That every facility be afforded by the directors and officers of the company to such committee, and that the committee be empowered to examine all books and documents and to employ any professional assistance they may deem necessary in the progress of their enquiry;" and it was further unanimously resolved—"That Mr. A. H. Phillpotts, Mr. F. P. Crowther, Mr. J. A. Mays, Mr. Frederick Youle, and Mr. John Bayliss should form the committee, with power to add to their number."

That meeting, owing to an error in the notice which convened it, was informal, but the above resolution was rendered valid by being again passed at the extraordinary general meeting, held on Dec. 9, 1884. The committee, meanwhile, had been strengthened by Mr. Thomas J. Bewick and Mr. Thomas Phillpotts consenting to act, thereby making up the maximum number of members to seven, as authorised by the resolution. At the first meeting of the committee, Mr. A. H. Phillpotts was appointed Chairman. After the investigation had proceeded a few days, the committee felt that it was desirable, in discharge of their duty to the shareholders, to issue a short preliminary report, and to suggest the immediate retirement of the directors. There were several conferences between the directors and the committee, which resulted in an arrangement that a meeting of shareholders should be convened for Dec. 9, 1884, to consider the preliminary report of the committee, and that, if the shareholders adopted the recommendations therein, the directors (excepting Lord Castletown, who had not attended any of the conferences) would resign. A copy of the committee's preliminary report, dated Dec. 5, 1884, may be obtained by any shareholder on written application to the secretary. At the meeting on Dec. 9, 1884, the shareholders, by a very large majority, adopted the preliminary report of the committee, and approved the following gentlemen as directors of the new board:—Messrs. John Bayliss, Thomas J. Bewick, F. P. Crowther, Thomas Phillpotts, and Stewart Pixley. On Dec. 16, 1884, all the then directors (except Lord Castletown), resigned their seats, and the gentlemen above-named assumed office as directors of the company. Lord Castletown claims a seat at the new board, and is within his strict legal right in doing so, as under the existing Articles of Association, all the directors were entitled to hold office, without offering themselves for re-election, for a period of three years—until March, 1886. As a matter of principle the committee are of opinion that such an arbitrary provision as a fixed term of office for three years, it is not in the interest of shareholders, and ought not to be found in the Articles of Association of any company. After a lengthened and careful enquiry the committee are confirmed in their first impression—that two essentials were absolutely necessary, as a basis, for placing the affairs of the company on a footing satisfactory and profitable to the shareholders. First, a complete change of the directorate in London; and, secondly, the removal of the late manager at the mines and material alterations in the system of management, both in America and in England. The first point having been secured, by the friendly co-operation of six of the late directors and their retirement from office, and the second having resulted from the recent resignation of Mr. George Attwood, the late manager at Marysville, the labour of the committee has been lightened, and this report will be much shorter than it would otherwise have been; but, in discharge of the duties imposed upon them by the resolution of the shareholders, the committee feel called upon to refer to the various important subjects affecting the welfare of the company.

PROMOTION AND FORMATION OF THE COMPANY.—Having regard to the questions raised by the report of Mr. Hamilton Smith, jun., as to the quantity and value of the ore reserves on the Drum-Lummon lode, the committee were anxious to ascertain whether there had been any misrepresentations in the prospectus, or on the part of the Joint-stock Association, as vendors, in respect to which the shareholders would have a legal remedy; but after obtaining all the evidence possible and submitting the facts to well-known legal advisers for their opinion, the committee are advised adversely to there being any legal remedy. The working of the mine since the change in the administration tends to prove that the doubts raised as to its value are groundless. The committee feel it right to state that the Chairman of the Joint-stock Association attended as a witness, and handed in a written statement as to the formation of the company, and also produced for inspection the various proofs of the prospectus, and the correspondence relating thereto; and further, that it is proved that after the purchase by the company was completed, the Joint-stock Association offered "to give their acceptances for 50,000*l*., and lodge as collateral security fully-paid up shares in the Montana Company to the amount of 75,000*l*.," in order to get, without delay, stamps and machinery for the efficient working of the produce of the mine. The committee were glad to find in this offer evidence of the confidence the association had in the value and prospects of the mine, and such confidence they still entertain.

ARTICLES OF ASSOCIATION.—It having long been felt that many of the existing Articles of Association were unjustifiable the committee have carefully considered them, and with the concurrence of the recently-elected directors, have agreed upon the necessary alterations, and the revised Articles will be submitted for the approval of the shareholders at the next meeting. Briefly, they are wholly altered in the interests of the shareholders—the object being to place the company on a sound and constitutional basis, to reduce the remuneration of the directors from 2500*l*. per annum, to 1250*l*., to confine the voting power of large shareholders within reasonable limits, and generally to restrict the power of the directors as against the shareholders, and to give the shareholders in future more power over the directors than they have had in the past; and should the shareholders have reason to be dissatisfied with the acts of the directors, they will have, under the revised Articles, the power of more speedily giving expression to their views and securing a remedy: Two half-yearly meetings, as proposed, instead of one annual meeting, will also contribute to this desirable result.

The second annual report of the directors (the new board) to be presented to the meeting on the 19th inst. is as follows:—Inasmuch as the accounts from the mine were not received in time to prepare a balance-sheet, and it was necessary in compliance with the provisions of the Articles of Association to have the annual meeting in the month of February, a circular was issued calling the meeting on Feb. 25 last, but it was explained to the shareholders that such meeting would only be held *pro forma*, and would be adjourned to Thursday March 19, 1885. The directors now beg to submit to the shareholders the annual report, together with a balance-sheet and profit and loss account for the year ending Dec. 31, 1884. It will be in the recollection of the shareholders that a Committee of Enquiry, consisting of seven shareholders, was appointed on Nov. 19, 1884, and that the five new directors who were elected in the place of the six gentlemen who retired from the board assumed office on Dec. 16 last. The directors and the committee of enquiry have worked together in most perfect harmony, and the latter have left valuable recommendations as to the future administration of the company's affairs, which will certainly not be lost sight of by the present board.

The final report of the Committee of Enquiry was issued to the shareholders on March 9. It entered so fully into detail, and was of such a comprehensive character, that the directors do not think it necessary to go over the same ground, nor do they consider it would be profitable or agreeable to the shareholders that they should, in this report, revert to the various disagreeable incidents which led to a change being made in the directorate. They prefer rather to confine their observations as much as possible to an exposition of the present state of your affairs, and to dwell upon the improved aspects which augur so favourably for the welfare of the company in the immediate future. The late board having determined to recall their manager, it became necessary to find some trustworthy and competent person to take temporary charge of the company's property until a more permanent arrangement could be concluded. Mr. Attwood tendered his resignation as general manager on Jan. 28, which was accepted. The perplexity in which the late board found themselves was relieved by Mr. R. T. Bayliss, who generously consented to leave his home and business, and proceed, at only 48 hours' notice, to Marysville, and take over charge of the company's property before Mr. Attwood left for England. Mr. H. Bratnober, who had previous knowledge of the property, accompanied Mr. R. T. Bayliss, having been appointed to act as mine superintendent, under Mr. Bayliss. The zeal, ability, and devotion to the interests of the company which these two gentlemen have displayed must be apparent to every shareholder who watched the improvement in the monthly returns, showing, as they do, considerable increase in the yield, and a great diminution in the expenses, and that the mine is now being worked at a profit instead of at a loss as heretofore. The directors take this opportunity of bringing prominently to the notice of the shareholders the commendable efforts of these gentlemen, whose merits they consider deserving of the highest encomiums, and they feel confident that the general body of shareholders will cordially join the board in acknowledging their valuable services. The directors have unanimously elected Mr. Robert Maitland Brereton, C.E., to succeed to the responsible position of general manager. Mr. Brereton's professional reputation, combined with his high personal character for integrity and practical knowledge of mining, and experience of the habits which prevail in the mining camps on the Pacific coast, render him in the opinion of your directors eminently fitted for such a responsible position of trust. Mr. Brereton will leave England in the course of the ensuing month, and Mr. R. T. Bayliss has kindly undertaken to remain at Marysville for a short period after his arrival so as to communicate and advise with him upon the various matters affecting the interests of the company. The directors have received a very full report on the mine from Mr. Bratnober, but too voluminous and full of technical details to give *in extenso*. Should, however, any shareholder desire to study it at his leisure, at the office of the company, the directors will be pleased to submit it to him, together with the plans and sections which accompany it; in the meanwhile, the following extracts will, they believe, be read with interest.

Extracts from Mr. Bratnober's report on the mine, dated Jan. 29, 1885, received Feb. 20, 1885.

"I have taken samples from all the ground above the Cruse level, and am fully convinced that there is an immense body of ore between that level and the surface which will yield a handsome profit, and keep the mill running for a considerable time, apart from any ore we may obtain below it. I must ask for a little patience, but in the course of a few weeks I shall be able to open stopes in all the levels we are now working, and when that is accomplished, the cost of supplying the mill with all the ore it requires will be considerably reduced. In my opinion there is sufficient ore in sight now and indications of ore in our present workings to keep your 50 stamp mill going for years to come. In addition to this, I have no hesitation in saying that practically your mine is unprospected. I am confident that developments on the Old Standard in due time, when circumstances and weather permit it, will be attended with the most gratifying results. It would be quite possible for me to send down ore to the mill for the next month or two, which would bring up your month's returns to a much higher average than anything that has yet been obtained; but it is my determination so long as I am favoured with the management of the workings in the mine, not to rob it for the sake of making one or two extraordinary returns. I am fully supported by Mr. Bayliss in this matter, and with him I trust to see the monthly returns steadily increasing, instead of jumping up, and then falling off in the course of a month or two, in consequence of the mine having been unfairly worked."

Mr. R. T. Bayliss writes on Feb. 8, 1885:—"It is with great satisfaction that I feel myself able to inform you this week that everything is going along as well as I could wish. The whole mill is going along more satisfactorily than at any time since I came here."

When we remember that during the last four months of Mr. Attwood's management, August to November, both inclusive, the average yield of the ores milled was only $11·46 per ton, and that each month's working showed a considerable loss, and we now see the improvement that has been going on from Dec. 10, 1884 (the day on which Mr. R. T. Bayliss took charge of the property) to the end of February, the average yield or value of the same having risen to $23 38 per ton, leaving a considerable monthly profit; and we are assured that there is plenty of ore—and good ore—in sight to supply the 50 stamp mill for years to come, the significance of the extracts will be apparent, as also of the following comparative statement of ore crushed under the late and present management:—

Mr. GEORGE ATTWOOD, Manager. August to November, 1884. (122 days.)			Mr. RAWLINSON T. BAYLISS, Manager. Dec. 10, 1884, to Feb. 28, 1885. (81 days.)		
1884. Tons crushed.			1884. Tons crushed.		
August.....	2,341 yielding	$21,679	December	1242 yielding	$23,886
September ...	3,249 ,,	33,074	1885.		
October	3,391 ,,	35,274	January	2157 ,,	53,792
November ...	2,861 ,,	40,578	February	2139 ,,	51,849
Tons	11,824 yielding	$135,705	Tons	5533 yielding	$129,527
Average, $11·46 per ton.			Average, $23·38 per ton.		

and the "workmen's pay roll," since Mr. Attwood left, has been reduced upwards of 20 per cent.

The following are extracts from the last report received from Mr. R. T. Bayliss, dated Feb. 15, 1885, received March 7, 1885, in reply to a suggestion that no time should be lost in ascertaining the best method of treating the ores of the Armitage lode:—"There is unbroken ground on the Drum-Lummon, which must contain large bodies of ore, ground that has hardly been looked at yet, which will yield sufficient ore to keep your mill running for some years, and, knowing this, and that your large mine has been neglected and undeveloped, it makes me feel impatient to find so much made of this Armitage lode, and to hear it talked about as though it was the last hope of the company. I think it is far more important for us to consider the best means of treating the ore we have, rather than that we should devote our time to devising some manner of treating the ore from the Armitage lode.—The 10 Stamp Mill: I think that this mill may be profitably worked next summer, but at present it is frozen up, and apart from this in the present severe weather, and with the bad roads—or rather no roads at all—it would entail a serious cost to get the ore to the mill. I am satisfied now that the best and most economical manner in which you can treat this ore is to first get all you can by amalgamation, and then concentrate and ship the tailings. Roasting you cannot afford, as the ore is not of sufficient high grade to stand the expense it would entail. We continue stoping up from the Maskelyne level to connect with No. 3, and shortly commence stoping in that cross-cut and No. 2 to connect with those above them. When this new connection is complete from the Maskelyne level to the 135 ft. level, and I think it will be accomplished in about two months, the mine will be opened out so that you can not only get all the ore you require, but can obtain it and put it into the mill at about one-half the present cost."

This mortgage, with interest, amounting to 33,540*l*., became due on Feb. 18, 1885. Application was made to Mr. Cruse to extend the time for paying off this mortgage for 12 months, but as that gentleman declined to do so, your directors made arrangements to meet this and other pressing liabilities, and are happy to inform the shareholders that the mortgage was paid in full, with interest to date, on Feb. 13, 1885, and the fact has been duly recorded in the Recorder's office at Helena, and a proper release obtained from Mr. Cruse. The company's account with the bankers at Helena is in a far more satisfactory condition than it has been for a long time past, the overdraft having been so much diminished as to render it unnecessary for the general manager to feel himself dependent upon any particular bank for any advances he may require pending sales and realisations on bullion produced. Apart from the necessities of the case in respect of the actual falling due of the mortgage debt to Mr. Cruse, it has been obvious from all that has recently arisen, that the company could only carry on its operations in safety on the footing of having no American creditors, who could at any moment put in force the stringent provisions of the American law, and attach its property. In order, therefore, to be in a position to pay off Mr. Cruse's mortgage, and also to meet other liabilities of the company, it became necessary to raise the sum of 60,000*l*. Subscriptions by the directors, some of the ex-directors, and members of the Committee of Enquiry, the Joint-stock Association, and others interested in the prosperity of the company, enabled your directors to attain this desired object. They have allotted 8 per cent. mortgage debenture bonds for the amount, to be paid off in three years or earlier, at the option of the board, on giving six months' notice to the bondholders. The bonds are of 20*l*. each, and the interest is to be paid quarterly from March 25, 1885. The bondholders have the option any time before Sept. 29, 1885, of taking repayment to the extent of 50 per cent. of the bonds they hold, in ordinary shares of the company, at par price of 2*l*. per share. Every shareholder had an opportunity afforded him of participating in the allotment of these bonds. Many availed themselves of the option, and the original guarantors of the subscription list for the 60,000*l*. accepted a *pro rata* allotment with the other shareholders who had applied for bonds. The trustees for the bondholders are Messrs. A. H. Phillpotts, Martin R. Smith, and Fredk. Youle, and the thanks of the shareholders are due to these gentlemen for consenting to act as trustees. A duplicate of the trust deed has been sent to Helena to be duly recorded. The distribution of an interim dividend of 8d. per share, as announced in the circular of July 16, 1884, is thus explained:—The late board being of opinion that a profit had been earned upon the working of the mine during the first six months of 1884, consulted the auditor on the question whether such profit, if it had been earned, but employed in aid of the company's other resources for capital purposes could be distributed when funds were available? He answered this question in the affirmative. He did not assert that a profit equal to 8d. per share had been earned, but thought this was probable. Upon that the directors decided to make the distribution in question. The directors were not in possession, on July 16 last, of adequate information for their guidance in estimating whether a profit had been realised or not. When the audit of 1883 was in progress the auditor drew attention to the insufficiency of information, and he arranged with the board that a memorandum should be sent to Mr. Attwood upon the subject of the 1883 accounts, with a view to their being thoroughly discussed. This memorandum was furnished by him on March 20, 1884. In it he stated that the general condition of the accounts was such as forbade an exact determination of the amounts properly chargeable against capital and revenue respectively, and also mentioned that the apportionment of certain items was entirely haphazard, and might be far enough from the truth. No reply to this memorandum reached England until August following, and the papers then received were not in a proper form, and had to be referred back for further explanation. The auditor has accordingly pointed out to the directors the need there is for placing him in direct communication with the accountant at the mine, and arrangements have been made for that purpose.

Your directors herewith render the balance-sheet and statements of account made out as fully as the materials at their command will permit, and hope that the future half-yearly statements will be more explicit and comprehensive than those which accompany this report. Your directors participate in the feelings of regret expressed by the Committee of Enquiry in their final report, that the agreement with these gentlemen was ever entered into. Your directors fully concur in the alterations recommended by the Committee of Enquiry in their final report, and strongly urge their adoption. As matters of great importance will have to be decided at the meeting called for the 19th inst., your directors will feel obliged if shareholders will sign and return the accompanying form of proxy, in favour of those gentlemen whose names are mentioned therein. It is necessary proxies should reach the secretary of the company not later than the morning of Wednesday, the 18th inst.

The secretary announces the following telegram received from the manager of the mine on the 11th inst.:—"Run first week in March 623 tons, yielding $10,356."—N.B. First week after clean-up.

GASEOUS FUEL.

Towards the close of last week an important paper bearing the title of "Gaseous Fuel" was read before the Birmingham and Midland Section of the Society of Chemical Industry in the Midland Institute, Birmingham, by Mr. R. SMITH-CASSON, of Brierley Hill, manager of the Earl of Dudley's Round Oak Ironworks. Having pointed out the difficulties which prevented the greatest possible heat being got out of solid fuel, the author said that a step towards the initial use of fuel in the gaseous condition was undoubtedly that of grinding it up to very fine powder before mingling it with the air for combustion. Many elaborate attempts had been made in this direction, and it had been found that when the fuel itself did the work a proportion of the heat was transmuted. Slack coal, he considered, ought to be more economical in this process than lump coal, and when properly supplied, that was to say supplied in a mode suited to its state of aggregation, there was no doubt that this was the case. A further stage towards the initial use had been the introduction of a liquid hydro-carbon, such as petroleum, but the most perfect purpose ever used for producing heat by combustion was the oxy-hydrogen blow-pipe. The jet of this blow-pipe could easily fuse platinum or fire-clay. The principles deduced from these considerations had been embodied in the construction of furnaces which had been in use for seven years at the Earl of Dudley's Round Oak Ironworks. Mr. Casson exhibited a model of one of these furnaces, and explained that the first operation was to have the fuel distilled into gas—mainly carbonic oxide by the Siemens' process. This operation was varied by the addition to the producer of an automatic hopper for the supply of coal, and then the next step was to combine the gaseous fuel with the hot air at the furnace mouth. The flue by which the gaseous fuel was conveyed to the furnace was jacketted with the hot air. With South Staffordshire coal it was found necessary to use a blast to force the gas through, and to regulate the subsequent combustion of the air with it. The waste gases, instead of being utilised as in the Siemens' process for regenerative purposes, were used for raising steam, and Mr. Casson stated that almost as much steam per 1 lb. of fuel was obtained from them as from coal used in the ordinary firing boiler. There was, moreover, no smoke. The largest furnace at Round Oak was 29 ft. in internal diameter, and 25 cwts. of iron was sometimes heated in an hour, or re-heated in 20 minutes. These furnaces give a great economy of fuel for a reason other than those already set forth—that they burnt the screened slack, which was worked with the aid of Henderson's mechanical firing arrangements. An interesting discussion took place in which Messrs. Dawson, Evans, Barker, Hunt, and others joined, after which a vote of thanks was unanimously accorded to the author.

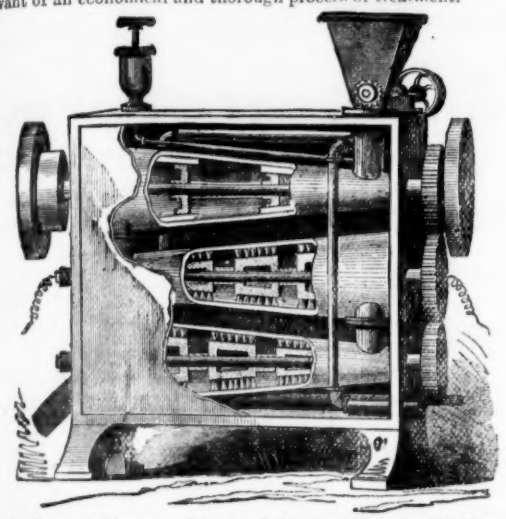
BREACH OF COLLIERY REGULATIONS IN IRELAND.—At the Ballylinan Petty Sessions, Queen's County, on the 7th instant, on the complaint of Mr. John Rotchford, owner of the Wolfhill Colliery, Pat Doyle, a banksman, was fined 5s. for, on Jan. 15th last, when work had ceased, omitting to put up the fencing as required by the special rules established under the Coal Mines Regulation Act, 1872. It appears that on the night in question a person named John Moore fell down the shaft and was killed.

HOLLOWAY'S PILLS.—The stomach and its troubles cause more discomfort and bring more unhappiness than is commonly supposed. The thousand ills that settle there may be prevented or dislodged by the judicious use of these purifying pills, which act as a sure, gentle, anti-acid aperient, without annoying the nerves of the most susceptible or irritating the most delicate organisation. Holloway's pills will bestow comfort and confer relief on every headachy, dyspeptic, and sickly sufferer, whose tortures make him a burden to himself, and a bugbear to his friends. These pills have long been the popular remedy for a weak stomach, for a disordered liver, or a paralysed digestion, which yield without difficulty to their regulating, purifying, and tonic qualities.

NOVEL ELECTRO METALLURGICAL MACHINE.

PROFESSOR JAMES MANES AND SONS call the attention of miners, mineowners, capitalists, and others interested in the working of gold or silver mines to their new Electro Metallurgical Machine for extracting fine and rusty gold from sands or tailings of stamp mills, or the sands of hydraulic gold diggings, or from the black sands on the coast of Oregon or California, and other parts of the world where gold is found.

The problem that has long troubled the worker of free-milling gold and silver ores is a method to save the mineral now lost in the tailings of stamp mills or flumes. This alone, if it could be saved, would amount to many million dollars profit each year, besides enabling the working of much territory which is now lying idle for want of an economical and thorough process of treatment.



Prof. James Manes and Sons, of Denver, Colorado, U.S., have invented a machine (represented in the above engraving) which it it claimed will save nearly the entire amount of mineral which passes through it, the loss not being over 10 per cent., and in many cases not in excess of half that amount. The machine is a cheap and practical process—it never need stop for charging or cleaning up, being nearly self-acting. Steam, electricity, and mercury are used in the process of extracting the mineral.

This machine or amalgamator is adapted for free-milling gold or silver ores, or refractory after roasting. It consists of a series of three or more large cylinders, wider at one end than the other, placed one above the other in a horizontal position, a shaft or spindle running through the centre of each.

The ore and mercury are fed into the first cylinder, passing into the second, and then to the third. The first cylinder is furnished with steel mullers which nearly touch the sides of the cylinder, and revolve at a good rate of speed, mixing the mercury and ore. The second cylinder is furnished with large steel brushes attached to the shaft or spindle, revolving at a high rate of speed; through this a current of electricity is furnished by a Westinghouse dynamic electro machine, which materially assists in gathering the particles of very fine gold together, and thoroughly amalgamating the metal and mercury. The third cylinder is similarly furnished to the second; into this the amalgam passes, and is again acted upon and mixed by the brushes to catch any gold which might have escaped amalgamation in the second. A fourth cylinder may be used found necessary.

The amalgamated pulp then passes through a revolving copper drum, plated with quicksilver inside. As the drum revolves it takes up the most part of the amalgamated gold. As the inside of the drum is constantly washed with a spray of water from perforated pipes fixed inside of said drum, a clean-plated surface is constantly brought in contact with the pulp or tailings as it passes out from the cylinders. After leaving the drum it falls down on to incline copper plates, the same as is now used in stamp mills.

The amalgam can be collected from the drum and plates without stopping the machine, and any live quicksilver that passes will be caught in syphons. The tailings are carried off with the water. The machine when attached to the flume will be driven by the waste water; it sifts the fine sands from the coarse gravel, and amalgamates it as above.

The specific points claimed by Prof. Manes and Sons in their patent are—

1.—The saving of almost all the mineral passing through the machine.

2.—The loss being less than 10 per cent.

3.—The entire absence of loss of the amalgamated material, thereby saving all the mercury, which, with the processes now in use, there is a large loss both of mercury and the precious metal.

4.—The small cost per ton at which the ore can be treated.

By the addition of the powerful current of electricity that passes off the revolving brushes, the most minute particles of gold will be caught and retained, which in the ordinary flume and stamps passes off with the water; this often amounts to a large percentage.

The inventors state that if English stock companies will give their assistance to work the black sands of Oregon and California by paying for the building of the machines, they will take a share of the gold for their services, or they will send their machines to any part of the world, or will sell patent rights to those desiring any of their patent machines or revolving furnaces for roasting or smelting ores, ball pulverisers, &c.

Prof. James Manes and Sons are agents for the Morey and Sparey Ball Pulveriser, that crushes and pulverises at the same time, and does as much work as eight stamps in a day, crushing either wet or dry.

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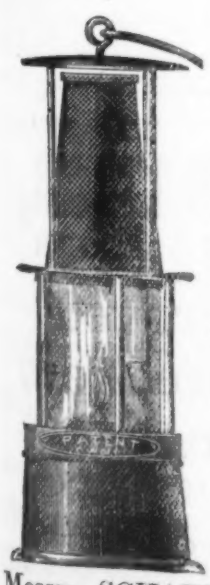

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For full description of the WOLF LAMP see Report of Manchester Geological Society, "MINING JOURNAL," January 17th, 1885.

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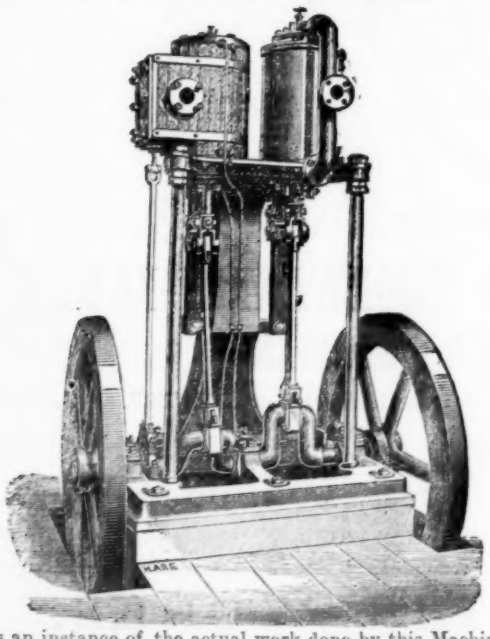

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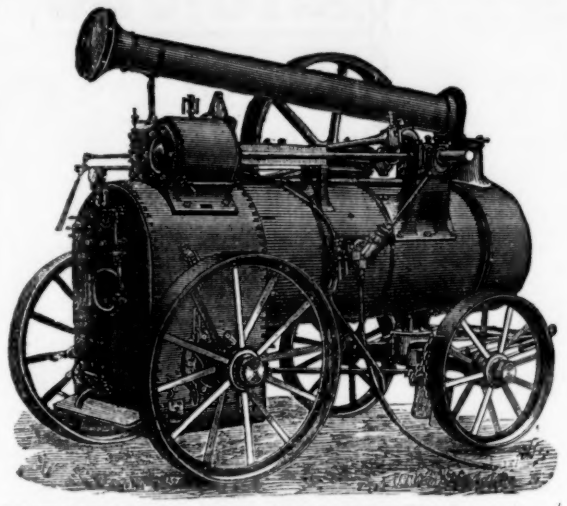

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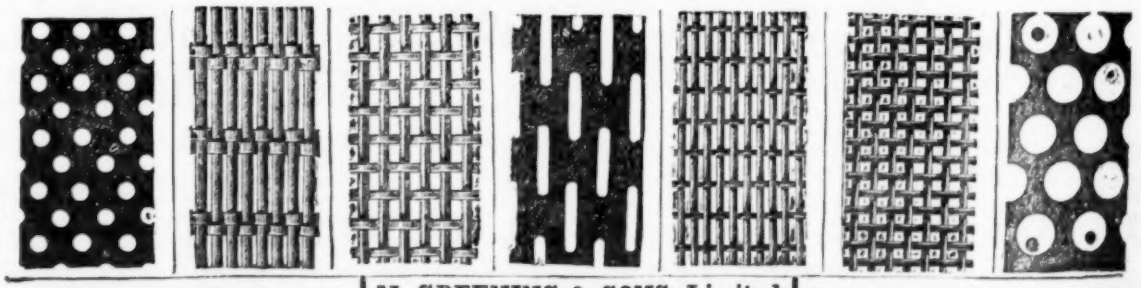

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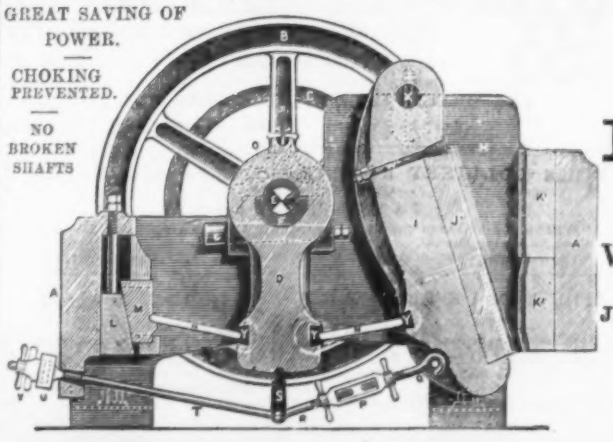

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With Patent Governor.

Steam Jacketted Cylinder lagged with Sheet Steel.

Steel Crosshead, Piston-rod, and Valve Spindles, Wrought Iron Crank Shaft, Connecting-rod, and Front Columns.

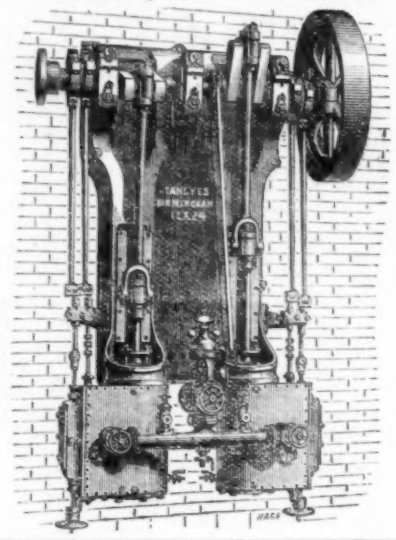
Nominal Horse-power	14	16
Diam. Steam Cylinders ..... in.	12	13
Length Stroke ..... "	18	18
Revolutions per Minute	125	125
Price of Engine ..... £	142	155
Feed Pump with G.M. working parts, extra £	8	8
Variable Expansion Gear ..... " £	15	15
Holding-down Bolts and Plates ..... " £	5	5
Fly-wheel ..... in.	72×9	78×9
Diam. Steam In and Outlets ..... "	3 & 4	3 & 4

24

TANGYES' "BELFAST" STEAM ENGINE,

Vertical Coupled, with Patent Governor.

The illustration represents the Coupled "Belfast" Engine, described page 13, arranged to work vertically.



To facilitate fixing against a wall a heavy Fly-wheel, of small diameter, is supplied with this arrangement. A Half Coupling, on each end of Shafts, is included in price.

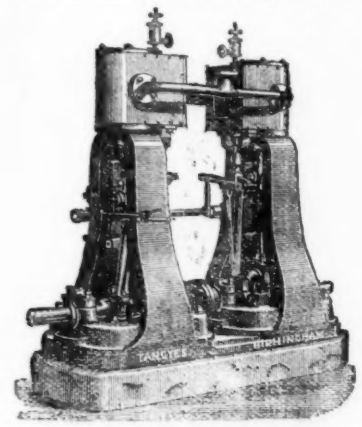
Nominal Horse-power	20	23	32
Diam. Steam Cylinders ..... in.	10	12	13
Length Stroke ..... "	13	24	24
Revolutions per Minute	130	121	125
Price of Pair Engines ..... £	240	284	310
Variable Expansion Gear ..... extra £	36	38	78
Fly-wheel, in halves ..... in.	48×3	54×9	54×9
Diam. Steam In and Two Outlets ..... "	3	3½	4

25

TANGYES' VERTICAL STEAM ENGINE,

COUPLED,

With Link Motion Reversing Gear.



Nominal Horse-power	4	6	8	12	20	24	28
Diam. Steam Cylinders ..... ins	4	5	6½	8	10	11¼	12
Revolutions per Minute	250	240	190	180	150	150	130
Price Pair of Engines ..... £	59	76	100	125	183	221	266
Diam. Steam Inlet ..... ins	1¼	1¾	2	2½	3½	3½	4
" Exhaust Outlets (two) "	1¼	1½	2	2½	3	3	3½

A Stop Valve is included in price.

No Governor nor Feed Pump supplied with this arrangement.

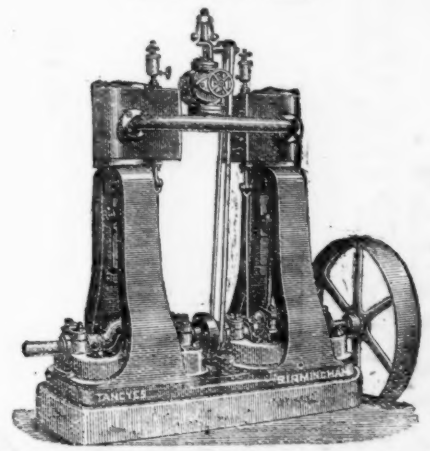
NOTE.—The 4 and 6-horse power Engines are same design as that shown on page 18.

23

TANGYES' VERTICAL STEAM ENGINE,

COUPLED,

With Patent Governor.



Nominal horse-power	4	6	8	12	16	20	24	28
Diam. Steam Cylinders ..... ins.	4	5	6½	8	9	10	11¾	12
Revolutions per Minute	240	240	190	180	180	150	150	130
Price Pair of Engines ..... £	43	58	74	97	118	150	188	230
Diam. Steam Inlet ..... ins.	1½	1¾	2	2½	2½	3½	3½	4
" Exhaust Outlets (two) "	1¼	1½	2	2½	2½	3	3	3½

Feed Pump, extra.

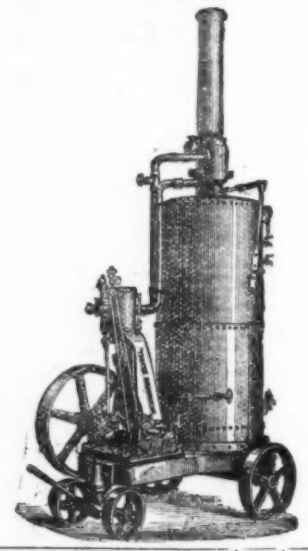
NOTE.—The 4 and 6-horse power Engines are same design as that shown on page 18.

22

TANGYES' VERTICAL STEAM ENGINE.

SINGLE STANDARD.

With Vertical Boiler on Wheels.



Feed-water Tank and Patent Governor.

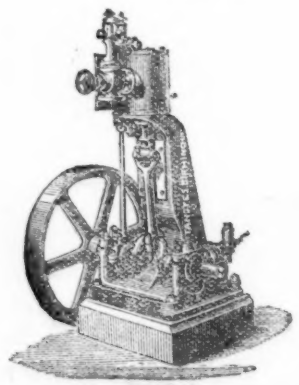
Nominal Horse-power	2	3
Diam. Steam Cylinder ..... ins.	4	5
Revolutions per Minute	240	240
Engine and Boiler on Wheels ..... £	63	79
" " without Wheels.. £	56	70
Diam. Fly-wheel ..... ins.	25	30
Width Face, turned ..... "	3½	4
Weight ..... cwts.	20	29

19

TANGYES' VERTICAL STEAM ENGINE,

SINGLE STANDARD.

With Patent Governor.



The Fly-wheel can be put on either end of Fly-wheel Shaft.

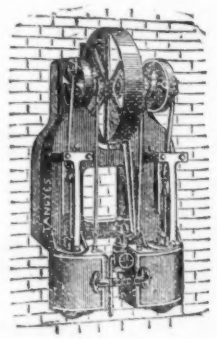
Nominal Horse-power	2	3
Diam. Steam Cylinder ..... ins.	4	5
Revolutions per Minute	240	240
Price of Engine ..... £	20	27
Feed Pump ..... extra	40/-	40/-
Holding down Bolts & Plates ... "	16/-	10/-
Diam. Fly-wheel ..... ins.	25	30
Width Face, turned ..... "	3½	4
Diam. Steam Inlet ..... "	1	1¼
" Exhaust Outlet ..... "	1¼	1½
Weight Engine and Fly-wheel..cwts.	4	6¼

18

TANGYES'

DOUBLE CYLINDER WALL STEAM ENGINE,

WITH PATENT GOVERNOR.



Nominal Horse-power	4	6	8
Diam. Steam Cylinders ..... ins	4	5	6
Length Stroke ..... "	8	10	12
Revolutions per Minute	180	144	120
Price of Engine ..... £	50	68	80
Diam. Pulley, in halves ..... ins	20	27	36
Width Face, turned ..... "	5½	7	8
Diam. Steam Inlet ..... "	1	1½	1¾
" each Exhaust Outlet ..... "	1¼	1½	1¾
Weight ..... cwts.	7½	13½	16½

It will be seen that these Engines can be placed to work horizontally by simply altering the position of the Governor.

28

WILLAN'S PATENT

THREE-CYLINDER ENGINE.

This Engine is exceedingly simple in construction, having neither eccentrics nor separate slide valves. It consists of three inverted cylinders, cast in one piece parallel to each other. Upon the side of the cylinders is a valve and lever, by which the Engine may be started, stopped, and reversed. All the working parts are contained in the cylinder casing.

For hoisting operations, and especially for use in foundries, and other purposes where precision in raising and lowering is important, this Engine will be found very suitable.

Diam. Steam Cylinders ..... ins.	4	5	6
Length Stroke ..... "	4	5	6
Revolutions per Minute	400	400	350
Price Engine ..... £	55	65	85
Governor ..... extra £	5 10	6	9

Driving Pulleys or Gear can be attached at either end of the crank shaft to suit requirements.

29

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THE BLAKE-MARSDEN NEW PATENT IMPROVED STONE BREAKERS AND ORE CRUSHERS.

ORIGINAL PATENTEE AND ONLY MAKER

H. R. MARSDEN,

ALSO PATENTEE AND ONLY MAKER OF THE

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FOR REDUCING TO AN IMPALPABLE POWDER, OR ANY DEGREE OF FINENESS REQUIRED,

GOLD QUARTZ, SILVER, COPPER, TIN, ZINC, LEAD,

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WITH PATENT FACED BACKS, REQUIRING NO WHITE METAL IN FIXING.

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EXTRACTS FROM TESTIMONIALS.
PULVERIZER.

"I have great pleasure in bearing testimony to the merits and capabilities of your patent combined fine crusher and sieving apparatus. I have tried it on a variety of ores and minerals, and it pulverizes them with equal success. You can put in a small paving stone and bring it out like flour."

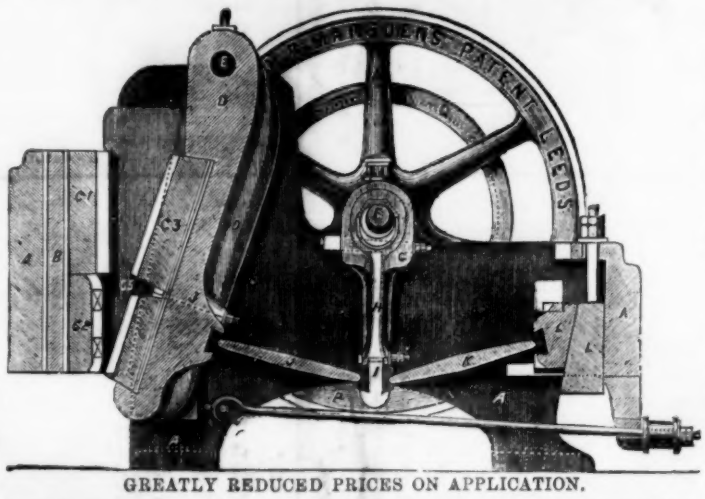
"In reply to your favour, I have much pleasure in informing you that the 12×3 Pulverizer we had from you is giving us every satisfaction. The material we are operating on is an exceptionally hard one. I am well satisfied with its working."

"Our experience is that the motion and mechanical arrangements of your machine are the best for pulverising that we have ever met with."

"The reports from our mines as regards the working of your Fine Crusher (20×5) recently supplied are very favourable, although we cannot quote you exact figures. On being got into position it was tried *by hand*, with the result that it made short work of the biggest pieces of ore we put into the hopper. You might say how long you would take to deliver another of the same size."

"As I once before stated, your machine is a perfect pulverizer."

"I am sure the machine will be a success, and a great one, and there is any amount of demand for such a machine. We can work it with 20 lbs. of steam, and our engine, which is a 12-h.p., plays with the work, in fact we run the Stonebreaker and the Pulverizer both together with 35 lbs."



GREATLY REDUCED PRICES ON APPLICATION.

EXTRACTS FROM TESTIMONIALS.—STONEBREAKER.

"I now order Three of your Stone Crushers, size 15 × 10, to be of your very best construction, and to include two extra sets of Jaws and Cheeks for each. The last two 24×13 machines you sent me, which are at work in this colony, are doing very well. You will soon find that the railway contractors will adopt your machines in preference to the colonial ones—two of which I have. I know other contractors have had as many as nine of them, which have not given very good satisfaction. Once they know of yours thoroughly, I believe you will do a good trade with the colonies. For reference of the high character of your constructions you can refer to me as having used them with the very best results, both in New Zealand and this colony, and much prefer them to the colonial article, both in point of construction and less liability to go out of order. The material we are crushing is very hard blue stone, for railway ballast purposes. Push on with the order as quickly as possible; I do not think it necessary to have any engineering inspection. I have brought your machines prominently under the notice of all large contractors in this colony, likewise the Government. Many of the contractors have spoken to me in reference to their capabilities, and I could only tell them that they are by far and away the best and most economical I ever used. The very fact of me having purchased now Eleven from you at various intervals and various sizes, and two above 12 years ago, and having tried all the other makers, is sufficient guarantee of the capabilities and the working of your machines. Yours in every way surpass all others."

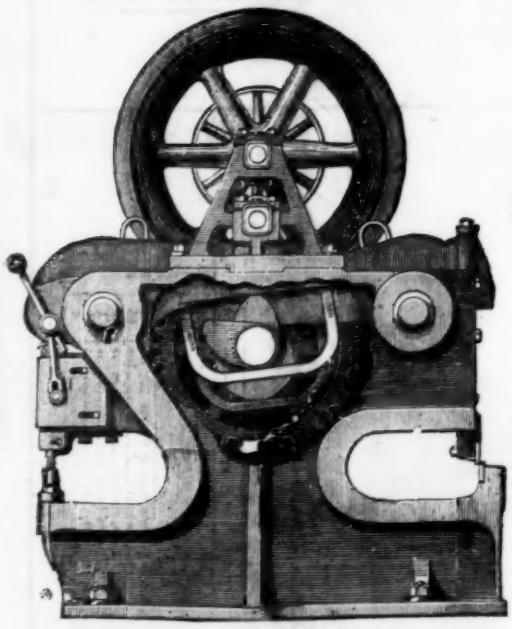
"Some of your testimonials do not give your machines half their due. I have seen men hammering away on a big rock for a quarter of a day which your machine would reduce to the required size in a quarter of a minute. I would guarantee that your largest size machine would reduce more of the Cornish tin capels (which is the hardest rock of England) in a day than 200 men, and at 1-25th the cost."

FOR CATALOGUES, TESTIMONIALS, &c., APPLY TO THE SOLE MAKER,

H. R. MARSDEN, SOHO FOUNDRY, LEEDS.

JOHN CAMERON'S

FLY-WHEELS ON BOTH SIDES.



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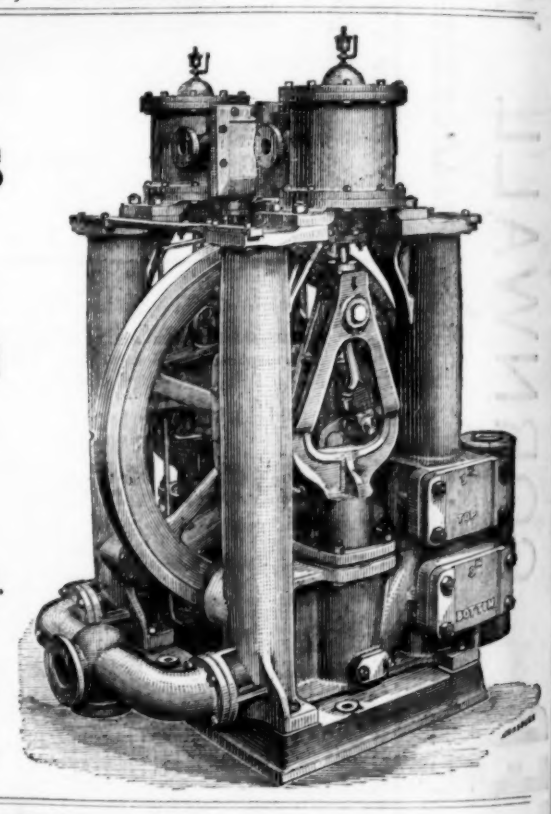

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